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Contractors and Engineers Monthly

Vol. 48, No. 3

MARCH, 1949

\$3 a Year, 50 Cents a Copy

Covering the Field

• Dam Completed, Dam Begun

An account of gate installation at Santa Fe Dam starts on this page.

Embankment and outlet-works contracts at Cherry Creek Dam are reported page 22.

• Made Land Enlarges Airport

Lake sand was pumped into a steel-sheeting enclosure to enlarge Chicago's lake-front airport. The story begins page 1.

• Highway Cost Accounting

Oregon makes complete cost analyses of 50 per cent of its highway contracts; contractors supply data. See this page.

• Floods Plague Bridge Builder

Contractor plays game of tag with rising waters as he pours concrete piers for new high-level river bridge. See page 2.

• Three Building Stories

Telephone Co. operators keep plugging as new quarters rise around them (page 5).

Page 83 deals with welded-frame power plants—their design and advantages.

The ground under a warehouse was recently stabilized by grouting. Turn to page 104.

• Heavy Grading for Highway

Three contractors excavate 3,000,000 cubic yards for highway relocation in Pennsylvania. Job details on page 9.

• Good Tools Up County Work

So says a county road supervisor, on page 27, citing what his crews have accomplished with good, plentiful equipment.

• Slopes Stabilized During Job

State finds that stabilizing slopes during construction, instead of after, prevents erosion and lowers costs—page 34.

• Safety With Job Analysis

Advance analysis of construction operations is paying off in safety records at Hungry Horse Dam, as told on page 27.

• Street, Highway Go Bituminous

Main city street gets sheet-asphalt pavement on concrete base—page 44.

U. S. 90 in Florida gets sand-asphalt plant-mix widening, surfacing—page 85.

• Irrigation Canal Lengthened

Special trimming and concrete-lining rigs are trouble-free on Winston-Utah 18-mile canal job described on page 49.

• ARBA 46th Meeting

Highlights of papers presented at the annual meeting of the ARBA are noted on page 56. New officers listed also.

• Road Maintenance Against Odds

Tricky soils and a low budget complicate highway doctoring in the cattle country of western Nebraska. See page 61.

• Walking Dragline Builds Levee

Huge machine casts dirt directly from pit to embankment of new setback levee. For full details, turn to page 68.

• U. S. 6 Gets New Concrete Section

Article on page 77 covers job from start to finish, stressing 40 per cent saving in drainage item, thanks to pipe culverts.

(You will find "In This Issue" on page 4)

Hydraulic Gates Installed in Dam

Ingenious Rigging and Careful Handling Needed To Fit 16 Heavy Gates In Santa Fe Dam

✦ CONSTRUCTION of a large dam does not end with the completion of concrete and earth work. Indeed, some of the most dramatic and dangerous operations follow the more prosaic chores performed by earth-movers and concrete mixers. Take, for example, the installation of heavy machinery in the dam.

Near Azusa, Calif., Guy F. Atkinson Co. of San Francisco has recently finished installing sixteen 50-ton hydraulic slide gates in the outlet works of Santa Fe Dam. The \$694,385 job, which included furnishing and placing the gates and piping, was done for the Los Angeles District Office of the Corps of Engineers, which designed and supervised the project. The Atkinson job also included about 1,700 cubic yards of concrete work to finish the blocked-out openings left for the service gates.

The gates were a tight fit. That was one of the main problems. All the big 10-ton pieces had to be brought in with only ¼ inch of headroom to spare, turned around or over, sometimes "telegraphed" about by old-time rigging methods, or stored temporarily in close working room. Reinforcing steel dowel bars from previous construction stuck out around the conduit liners to prevent the three liner sections from being placed in 1-2-3 order. It was a game of chess in construction, with a master rigger calling the moves.

Dam Built in Spurts

Santa Fe Dam, which controls the flow of the San Gabriel River about 10 miles below the mountains on a sloping (Continued on page 13, Col. 4)



C. & E. M. Photos

Two views of the enlargement contract at Chicago's Northerly Island Airport: above, a floating derrick loads riprap onto a scow; at right, a McKiernan-Terry hammer drives piles to enclose the new made land.



Airport Enlarged Inside Dock Wall

Sand Dredged From Lake Michigan Is Pumped Into Steel-Sheeting Enclosure At Chicago's Lake Front

✦ CHICAGO'S Northerly Island Airport has just been enlarged by reclaiming more land from Lake Michigan which practically surrounds it. The long, narrow island, separated from the Chicago shore line by lagoons, is connected to the mainland by a causeway at its north end where the Adler Planetarium is located. The upper third of the island is a park and bathing beach. The remaining southern section is a landing strip, from which planes can shuttle back and forth to connect with Chicago's main air terminal. The Northerly Island landing strip is only a few minutes by car from the heart of the Loop, the business and financial center of the great metropolis. The Chicago Airport, however, which is served by the passenger air lines, lies far on the outskirts of the city.

The airport was enlarged along the (Continued on page 93)

Cost Accountants Check Field Work

State Highway Analysts Get Complete Job Costs From Contractors; They Keep Information Secret

✦ ONE day 10 years or more ago, a representative of the State Tax Commission of the sovereign state of Oregon phoned R. H. Baldock, State Highway Engineer (and recently President of The American Association of State Highway Officials).

"Mr. Baldock," said the tax man, "I want your contract cost records."

Baldock said, "You can't have them. They're confidential information."

"That's just what we want. Figures on costs, on profits, and on the identity of the contractors. We must have them."

"Well, you can't have them, and that's that," said the State Highway Engineer.

"The State got all that information only by promising to keep it confidential."

The tax man grunted. "You make it difficult, Baldock. I'll get a writ of mandamus . . ."

"Yes, and when you do, I'll have the records destroyed, and Oregon will lose all the value of this information," the highway engineer said.

He heard no more about the matter from the Tax Commission.

That little incident is typical of the way one small department of the Oregon State Highway Commission keeps its promise not to divulge information on its files to anybody but interested people in the Highway Commission. As a result, in its 16 years of operation that department has learned what construction work actually costs.

The department is known as the Contract Cost Analysis Section of the Construction Department; and its budget is only \$30,000 a year. It is a small group, in which everybody works like mad. It has only six men, each of whom is an

(Continued on page 99)

PLANT-MIX FOR HIGHWAY IMPROVEMENT



C. & E. M. Photo

The asphalt plant which turned out widening and surfacing mix for Smith Engineering & Construction Co.'s improvement contract in Florida was mainly a Cedarapids unit. The Caterpillar M7 tractor at right is dosing a slag pile. The story is on page 85.

High Piers Required On New River Bridge

Carry Three Steel Truss Spans; Rest of 2,424-Foot Structure Has Concrete Bents, Steel Approaches

By WILLIAM H. QUIRK,
Eastern Editor

† THE Yazoo River in western Mississippi, about 9 miles north of Vicksburg, will soon have a new high bridge to carry U. S. 61 over its oftentimes flooded waters. A project of the Mississippi State Highway Department, the structure is 2,424 feet long. It consists of a three-span continuous truss of 864 feet over the normal width of river, and 1,560 feet of approaches. The center truss span is 324 feet, while the two other trusses, one on each side, are each 270 feet long. The south approach of 480 feet consists of seven spans: the first five, on the left bank of the river, 60 feet each; then an 80-foot; and then a 100-foot span next to the truss. From the truss northward the 1,080-foot approach consists of a 100-foot, an 80-foot, and fifteen 60-foot spans.

Work on the bridge started in the summer of 1947, but abnormal wet weather through the winter and early spring delayed construction progress considerably. However, the new structure was completed by the end of 1948.

Altogether, six major contracts were awarded by the Mississippi State Highway Department in connection with the project. Contract 1, handled by M. L. Green of Woodville, Miss., included 1.8 miles of approach fills both north and south of the river crossing. These roadway embankments were built from July to November, 1947, at a cost of \$137,000.

Contract 2 for the construction of the four concrete piers to support the three truss spans was let to Gordon Walker, a Baton Rouge, La., contractor, on a low bid of \$591,964.42. The 24 approach spans, consisting of concrete bents with steel superstructure, were included in contract 3 which went to Foster & Creighton Co. of Nashville, Tenn., for \$430,204.60. Both of these contracts started work in July, 1947, and were completed last autumn.

Contract 4, including the fabrication

and erection of the three continuous truss spans, was awarded to the Virginia Bridge Co. of Roanoke, Va., for \$287,000. Fabrication of the 1,026 tons of structural steel was done at the company's Birmingham, Ala., plant. This contract did not include the reinforced-concrete roadway deck slab which was let separately as contract 4B at an estimated cost of \$50,000. The concrete deck over the truss spans was laid late last fall after the steel erection was completed. The only work remaining is a pavement to go on the approach embankments either this winter or this spring. The total cost of the entire project will be slightly in excess of \$1,500,000.

On New Location

The new bridge is located about 3,000 feet downstream or west of the existing structure which crosses the Yazoo. The old bridge, completed in 1928, consisted of two 350-foot trusses spanning the river on three concrete piers—the center pier placed in the middle of the stream, and the other two at opposite banks—together with creosoted-timber approach spans on each side. The approaches were carried on timber tower bents. The roadway of the old bridge is only 20 feet wide, and on both sides the highway makes a sharp curve to gain the bridge structure.

Over the years the timber had been subject to decay and to the steady assault of woodpeckers—they took a great liking to the southern yellow pine of the piling. But real trouble developed in January, 1946, at the high bluff of the south-bank bridgehead. A fault in the limestone cliff resulted in a slide, causing the loss of the southern approach spans plus about 40 feet of adjoining embankment and pavement. Aid from the Federal government was at once forthcoming. Army Bailey bridge spans were thrown across the gap, and additional lengths were erected to extend back behind the original abutment. The 260-foot Bailey was supported on 12-inch steel H-piles, and was only wide enough for one-way traffic.

With such unsuitable foundation conditions at the old bridge site, state highway engineers naturally chose a differ-



C. & E. M. Photo

Although the approach span which failed on this old bridge across the Yazoo was replaced by a Bailey bridge, there was room for only one-way traffic, as you can see. This fact, plus sharp approach curves, necessitated a new bridge on new location.

ent location for the new span. This new location eliminated the former sharp curve at the south approach; it also made possible a structure high enough to insure a vertical clearance of 50 feet from high-water level to the bottom of the lowest steel member.

Some remarkable high-water marks have been recorded at this locality in the past—the highest at an elevation of 102.7, which is 12 feet above the natural ground in this flat delta country. In both 1927 and 1937 the river rose to over the 100 elevation mark during spring floods, and last spring an elevation of 88.5 was reached. Low water is at elevation 47.1, so when the river went to 102.7 it actually rose to the

amazing, and of course destructive, height of 55 feet.

The Federal government participated in the amount of \$50,000 to have a levee incorporated in the mile of approach-road section on the west bank of the river. This embankment has an average height of 11 feet, a 32-foot crown, and side slopes varying from 3½ to 1, to 4 to 1. At the abutment the fill widens out generously to 38 feet.

Pier Contract

The four piers for the truss spans in the Gordon Walker contract were numbered I, II, III, and IV from south to north. They are of reinforced-concrete

(Continued on next page)



C. & E. M. Photo

Looking north across the Yazoo River during Gordon Walker's pier construction for the new bridge. The tramway trestle from pier I to pier II is at the right. In the foreground are Navy rafts which floated the Pumpcrete line used to pour piers 3 and 4.



C. & E. M. Photo

The central concrete-mixing plant on the job consisted of a Johnson aggregate bin with a Bensons 2-yard concrete mixer beneath it.



C. & E. M. Photo

On the Foster & Creighton approach-span contract, concrete is emptied into forms at bent No. 2 from a ¼-yard concrete bucket.



C. & E. M. Photo

Here a Vulcan 800-A pile extractor pulls out a 35-foot length of steel sheet piling from the cofferdam built at bent No. 7.

construction with each footing supported on 288 untreated-timber piles. Yellow-pine piles 65 feet long were cut from the near-by woods and used for piers I and IV; for the river piers II and III, fir piles 80 feet long were shipped in from the west coast. The average pile spacing is 2½ feet both ways.

Work started first on pier I, with the contractor later building a wooden work trestle out from the shore to pier II. It was constructed with timber piles from 65 to 85 feet long, driven in bents on 18-foot centers. The piles were capped with 12 x 12's, across which were laid four 12 x 12 stringers to support a stout deck of 4 x 8 oak planks. Along the deck, 85-pound rails were placed on an 18-foot gage. Over this tramway track an American steam whirley was operated. The oil-burning rig had a three-drum hoist and a 95-foot boom.

The contractor also employed a floating crane rig in conjunction with the whirley working from the trestle. This consisted of a steel barge carrying a Link-Belt crane with a 75-foot boom. Also used on this phase of the work was a Koehring 601 crane with an 80-foot boom.

Steel Sheet Cofferdams

Using 1-yard clamshell buckets on the cranes, the contractor began excavating at pier I and went down to a depth of about 15 feet, sloping the sides back gradually. Land rigs did this work under dry conditions, for at that time the river was well down within its banks. Carnegie M-116 sheet piling was then driven by McKiernan-Terry No. 7 and 9B2 hammers to form a cofferdam. The steel sheeting weighed 36 pounds to the foot, was 65 feet long, and had an 8-inch driving toe. As the piling was driven, the area within was excavated, and assembled timber cribbing to brace the cofferdam was lowered into the hole.

The cribbing was made up of 12 x 12 pine or oak wales set on 5-foot vertical centers and separated by struts of pine piling. The excavation was 50 feet deep, and the cofferdam was built to contain a pier footing 60 feet 6 inches long x 30 feet 6 inches wide. The material excavated from the cofferdams was always placed downstream of the structures so that it would not be swept back against the sheeting and build up external pressures.

The untreated-timber foundation piles for the piers were driven by a McKiernan-Terry 9B2 hammer and a Vulcan No. 2 hammer, accompanied by jetting. Then a seal 4½ feet deep was poured with tremie concrete. The piles came through the seal to project 2½ feet into the footing above, which is 10½ feet thick. The seal and footing for pier IV are the same as for pier I, except that the bottom of seal for pier I is at elevation 45.0, or 5 feet higher

than the bottom of seal in pier IV which is at elevation 40.0. Bottom of concrete for piers II and III is at 10.0 elevation, and these two piers have a 9-foot seal and 11-foot-thick footings.

Tall Piers

Piers I and IV measure 100 and 105 feet high respectively, while piers II and III are 138 feet 7 inches from the bottom of seal to the top of cap. The caps are 38 feet 6 inches long, 6 feet wide, and 5 feet deep at the center line of roadway. The two columns for each pier are 6 feet square at the top and have a 3-inch chamfer at each corner. This chamfer widens out to 3 feet at the bottom, making the column an eight-sided shaft with a batter of ¾ inch per foot on all faces. A 2½-foot-thick web wall connects the piers up to elevation 106.0, which is well above the maximum high-water mark. At the bottom, the shafts on piers I and IV measure 12 feet between sides, and 14 feet for the taller piers II and III.

While pier I was built from the land,



C. & E. M. Photo

On the north approach of the new bridge across the Yazoo River in Western Mississippi, workmen use a Durex No. 5 tilting-table saw to cut form lumber. At right, is the Pumpcrete line supported on horses.

pier II was built both from the extended tramway trestle and from the floating rig. When the sheeting for the pier II cofferdam was being driven, an old raft was encountered made of cypress logs tied together with hard wooden dowels.

This obstacle was discovered at a depth of 25 feet, and had to be blasted out with dynamite. A sliding bank also caused trouble until the movement was stopped with a row of retaining piles.

(Continued on page 29, Col. 4)

University of Texas enlarges its stadium

Access streets, parking areas, sidewalks, area under stands are paved with Texaco Asphaltic Concrete

The enlarged stadium of the University of Texas. Photo taken during the game with Louisiana State University. General contractor was R. P. Farnsworth Company, Inc., of Houston. Texaco Asphalt paving was laid by Collins Construction Company, Austin.



Laying 2-inch Texaco Asphaltic Concrete paving on one of the streets leading to the stadium.



Under the stands, the 1½-inch asphalt surface was laid on a crushed stone base.



A Texaco Asphaltic Concrete sidewalk 15 to 20 feet wide was laid around most of the stadium.



The University of Texas has increased the seating capacity of its stadium from 46,000 to 66,000 at a cost of \$1,400,000.

An interesting feature of this noteworthy project is the variety of service which resilient, joint-free Texaco Asphalt paving is called upon to perform. In addition to several streets leading to the stadium, Texaco Asphaltic Concrete paving of the hot-mix, hot-laid type was laid on sidewalks and parking areas, as well as the area underneath the seats. A 2-inch asphalt surface was specified for the streets, while 1½-inches was considered adequate elsewhere.

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John Q. Motorist Is Getting Riled

Fair warning that John Q. Motorist is up in arms was sounded at the 46th annual convention of the American Automobile Association at San Antonio, Texas. Delegates at the recent meeting of the AAA, which represents 2,500,000 organized motorists in the nation, served notice that the abuses heaped today upon individual car owners have gone far enough.

John Q. Motorist is about to revolt. He's prepared to fight road-tax increases when they're coupled with road-tax diversion or extravagance. He's fed up with traffic hazards. Increasing toll-road fees are not to his liking. And gyp merchandising practices, as well as automobile designers responsible for high repair bills, are anathema to him.

At the four-day convention, he loaded his gun for a battle which should be of genuine concern to every state highway department and every highway contractor in the nation.

Tax increases, now justly under consideration in many states to meet the inflated cost of construction and maintenance, will be contested bitterly by John Q. until diversion of road funds is stopped. He is demanding and will continue to demand that highway departments assign expenditures to projects of major benefit to the general public.

To keep political considerations and special private interests from influencing highway construction, as they do in many sections of the country, John Q. Motorist gave notice that he will demand scheduled programs of construction and maintenance, in which he can have a voice.

He wants the Public Roads Administration to make an engineering-economic study to determine what portion of highway costs should properly be assigned to trucks.

He has become fed up with the automobile gray market, with mark-ups on "new-used" cars, with low trade-in allowances, and with the compulsory purchase of unwanted accessories at high prices, although the automobile supply picture seems slowly to be changing to alleviate these conditions. He hates storage garages and parking lots which can not be held financially responsible for automobiles left in their custody. He is ready to contest unjust arrests, as well as fee-grabbing constables and justices of the peace.

In fact, he is so preoccupied with what seem to be his legitimate gripes, that innocent bystanders are likely to be hurt. If John Q. Motorist revolts in force, even capable highway departments are apt to suffer. For though highway departments are traditionally the motorist's friend, they may very well be one of John Q.'s targets if he starts shooting wild.

In his attack, John Q. will have some justified complaints. But he may also

jump to far-fetched conclusions based on hasty judgements—conclusions disastrous to innocent highway departments. He will charge inefficiency, perhaps, when the "crime" may be just a mistake honestly made by an already overworked department.

According to a current report, the FBI is making an undercover investigation in one state of highway contracts in which Federal-Aid Highway Act funds are involved. There may be no basis for the report, but the very rumor of FBI participation may easily intensify John Q.'s wrath.

The only effective replies which highway departments in general can make to John Q. are these: (1) honest, efficient performance, (2) the immediate exclusion of politics in any form from state and Federal highway offices, (3) more engineering and less bootlicking, and (4) an effective public-relations job which gives the taxpayers the facts they are entitled to know, so they can see for themselves that road building is not easy.

When should these replies be made? They should have begun 25 years ago, and they should have been reiterated every year since.

Accidents don't happen—they are caused. Remember, safety always pays.

Toll Roads Are Like Pullmans, Says Reader

To the Editors,

CONTRACTORS AND ENGINEERS MONTHLY

I take exception to the article in the January issue entitled "Toll Gates and Tax Diversion". In our opinion, the toll road is to be used for the service and safety of the traveling public and, as such, can be paid for by those desiring to use it. It is available for them, but there is nothing mandatory that they shall use it, any more than because there happens to be a Pullman on a train you must use it. You can still use the day coach if you desire to in your travels on the railroad.

Personally, I am looking forward to the opportunity of traveling in comfort and safety on safe expressways by interconnected toll roads to the east coast in the next few years, and see no reason why I should be deprived of that privilege as a citizen, if I am willing to pay for that right.

Your thinking represents the thinking of the construction industry, which is interested in an opportunity to work and be of service to the general public. If we can expedite the safety and comfort of the traveling public by advancing the schedule of construction through the use of private funds, we feel that there should be better publicity afforded on this subject.

Very truly yours,

Ernest M. Green, President
Ohio Turnpike Committee

Wage-Law Violations Cited by Labor Dept.

On the basis of limited inspections in the construction industry during the 1948 fiscal year, it was revealed that \$413,310 is owed to 7,296 employees as back wages because of violations of the Fair Labor Standards Act (the Federal Wage and Hour Law) and the Public Contracts Act.

This was shown in a report made by William R. McComb, Administrator of the Wage and Hour and Public Contracts Division, United States Department of Labor. The report covers the 12-month inspection period ending June 30, 1948, during which 916 establishments in the construction industry were inspected.

Failure to make proper payment for

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overtime work was found to be the most common type of violation. And, despite the modest minimum wage requirement of 40 cents an hour, part of the back wages was owed because some employees had not always been paid even that amount. In addition to the minimum 40 cents, the Law also requires time-and-a-half pay for work after 40 hours a week. Violations of the child-labor provisions were also disclosed.

Mr. McComb pointed out that only a part of the nation's business establishments are inspected each year. But on the basis of the inspection made in 1948, he said, it would appear that many employers are still uncertain about how the basic wage and hour laws affect their employees. The Wage and Hour Law is more generally applicable than the Public Contracts Act, applying to employees engaged in interstate commerce; or in the production of goods for interstate commerce.

Administrator McComb attributes most violations to improper calculations of overtime compensation and improper application of the exemption provisions. He advises employers in doubt about any provision of either law to consult one of the Division's regional offices at Boston, New York, Philadelphia, Birmingham, Cleveland, Chicago, Kansas City, Dallas, or San Francisco.

Mr. McComb, in his report to the 81st Congress, also made several recommendations for changes in the Wage and Hour Law. These include raising the minimum wage to 75 cents an hour; granting power to the Administrator to permit him to sue employers for back wages due under the Act; and providing more flexibility in the Act's conditions for relaxation of overtime requirements in labor-management agreements for employment on an annual basis.

New Bulletins of the HRB

Publication of two new bulletins is announced by the Highway Research Board of the National Research Council. Bulletin No. 13 is entitled "The Appraisal of Terrain Conditions for Highway Engineering Purposes"; Bulletin No. 14, "Soils Committee Reports and Special Papers".

Bulletin 13 includes eight papers sponsored by the Committee on Surveying and Classifying Soils in Place for Engineering Purposes. These papers were presented at the 27th Annual Meeting of the Board. Bulletin No. 14 includes three committee reports and two special papers, which were also presented at the 27th meeting. They are concerned with frost heave and frost action in soil, soil-cement roads, soil-calcium-chloride roads, calcium chloride and the compaction of soils, and jacked-in-place pipe drainage.

Both of these booklets can be secured by writing to the publication office of the HRB at 2101 Constitution Ave., Washington 25, D. C. Cost of Bulletin 13 is \$1.50; the cost of Bulletin 14, \$60 per copy.

HERE'S THE ANSWER TO YOUR GRIPES, JOHN Q!



Heavy Floor Slab Lowered Safely by "Screwy" Scheme

**Telephone Co. Equipment
Keeps Operating as Steel
Frame for New Building
Rises Around It**

By **RAYMOND P. DAY**,
Western Editor

SEVENTEEN construction stiffs, using 6-foot wrenches, have just undertaken the "screwiest" building job of their life. Sparked by toots from their foreman's whistle, they spent two days lowering a 212-ton concrete-and-steel floor which they had purposely built too high and suspended on screws. Movie and still cameras recorded the grunt-and-groan saga, reported to be unprecedented in construction annals. The section-lowering method, conceived by Structural Engineer Maurice Sasso of Los Angeles, was born of necessity.

In enlarging the quarters of its central office, exchange, and equipment building at Cotner and Massachusetts Avenues in West Los Angeles, Calif., the Associated Telephone Co. decided to replace the one-story brick walls bearing the wood roof structure with a new two-story structural-steel frame and concrete floor slabs and walls. In other words, a new building was actually planned around the existing one.

However, the joker in the deck was the fact that the old building housed about \$2,000,000 worth of delicate telephone equipment, all in operation. With 29,000 subscribers in the West Los Angeles area depending on the red-brick building, it was absolutely imperative that operation of the delicate equipment continue unhampered.

Moisture and dust, the principal enemies of the intricate wires, relays, switchboards, and so on, had to be kept out while construction work was under way. The roof on the old building could not be removed until the second floor was poured, because of the danger from moisture. Foundations for the new columns had to be under-cut below the old basement, and this involved hand

labor. To make the new building earthquake-resistant, a unique new all-welded steel rigid-frame structure, with refinements, had to be designed. With about 60,000 pounds of batteries and other electrical power equipment planned for the future second floor, a design had to be planned to take care of the heavy load. Those were just a few of the problems.

Contract Is Drawn Up

Maurice Sasso, a quiet, competent structural-designing engineer in Los Angeles, was engaged to engineer and direct the execution of this project. Sasso has practiced structural design in the Los Angeles area for a quarter of a century, and he has recently developed a type of structural-steel rigid-frame building design which promises to cut building costs about 18 per cent. The design, which is being used on the telephone-building job, has already cut costs by 8 per cent and reduced the use of steel by 30 per cent.

Because no plans of the old building existed, and no one could foretell what the conditions would be, Sasso let the construction contract on a cost-plus basis, and the work when 75 per cent completed promised to total about

\$300,000. The general contract was let to Beyer & Abrahamson of Los Angeles. Steel erection was let to the National Iron Works, and a subcontract was let to the J.R. Cantrall Co. for the erection of the steel frame and the tricky floor-lowering job.

The job began March 1, 1948, and was slated for final completion by February 1, 1949.

Old Building Boxed In

Before anything could be done on the outside, all the vital telephone equipment had to be encased in a dust-proof container. Carpenters moved in and built a plywood lining over the walls and ceiling of the old building. No equipment could be moved, so the job was tedious. The plywood panels were

(Continued on next page)

FASTER LOADING

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COST-CUTTING
Application
of
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Hydraulics



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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Heavy Slab Lowered By a "Screwy" Scheme

(Continued from preceding page)

all brushed and cleaned outside the building to minimize the possibility of dust around the equipment.

When the lining had all been placed, the plywood was sealed at the joints by adhesive tape. The ceiling plywood was supported on patented steel pipe frames, spotted wherever possible around the equipment. This left the telephone room enclosed in a plywood box.

When that had been done, the walls of the old brick building were removed, leaving the roof in place. A great deal of poor concrete was also removed from the existing underground structure, and extensive hand labor was then used to excavate for the new column footings. Some of the dirt from this work had to be handled five times to get it into the dump trucks which hauled it away. Steel bearing plates were placed and carefully leveled on the top of these footings, to take the special steel columns that formed a part of Sasso's unusual design.

Unusual Columns Used

Fourteen steel columns of unusual design are used to carry the new building, and to aid in making it resistant to seismic movement. The columns were fabricated out of 4 x 6 x 5/8-inch steel angles, reinforced with 1/4 x 3 and 1/2 x 6-inch steel strap battens, welded to the angle steel. This type of design saves about 30 per cent of steel over conventional methods, and has the added advantage of permitting girders to pass continuously through the columns. An estimated saving in erection time of more than 50 per cent over conventional methods was another advantage.

The all-welded columns were hauled to the job on a trailer and set in place by a truck crane. Guy wires from each column held the top in place until the girders and intermediate floor beams



C. & E. M. Photo

The structural-steel rigid-frame building design which Maurice Sasso developed and used on the new addition to the Associated Telephone Co.'s central office in West Los Angeles is cutting costs by about 18 per cent.

could be slipped in place, adjusted, and welded. It is interesting to note that the columns were set very easily to thin tolerances: in fact, none was out of line or elevation more than 0.25 inch at the top, while the bottoms were exact.

The second-floor panel over the existing building measured 72 x 48 feet, so Sasso had to design very heavy girders to carry the heavy floor load over a 48-foot span. He used 30-inch-wide flange beams, weighing 124 pounds per linear foot, for the main cross girders. Smaller members of similar shape—24-inch-wide flange beams weighing 94 pounds per linear foot—were used to carry the roof. The intermediate floor beams are 10-inches weighing 17 pounds and spaced 5 feet center to center. The maximum floor span between girders was 10 feet. The roof deck of the old structure was used as a working deck when forms were erected for the concreting of the new second-floor deck. All forms were attached to and carried by the steel floor systems by means of bolts.

For all steel fabrication, Lincoln arc-welding equipment and welding rod

was used. All welders were certified through the City of Los Angeles, and the job had continuous welding inspection. Insofar as possible, all columns were built before they came to the job, but the field welding was also done to the same high standard of performance.

Second Floor Especially Tough

The toughest part of the job was the 72 x 48-foot second-floor concrete, which lay directly over the valuable telephone equipment.

"Anything could happen there", explained Mr. Sasso. "And if it did, telephone communications might have been out for many weeks".

To cut out all possible weight, Sasso specified the use of Rocklite concrete aggregate for this pour, and also for some fire-resistant concrete near the roof. Rocklite weighs only 94 pounds per cubic foot against about 141 for conventional concrete aggregate.

At each column, the girders had previously been set 65 inches high. They were held in that position by a steel 1 1/2-inch threaded rod, passing through a yoke connection in the girder, and

through removable steel shelves in the columns. The load was so arranged that it rested directly on the center of gravity of the two inside angles of each column. A nut was placed on the long bolt to hold it snug, and to permit the floor to be lowered at that point later on.

The girders at each column also protruded slightly beyond the back of the column. This was done to permit them to come to rest on the outside of the structural column, and to transfer the floor load to that point. A permanent steel shelf was set in the column at that point, at the floor-line grade, and welded tight.

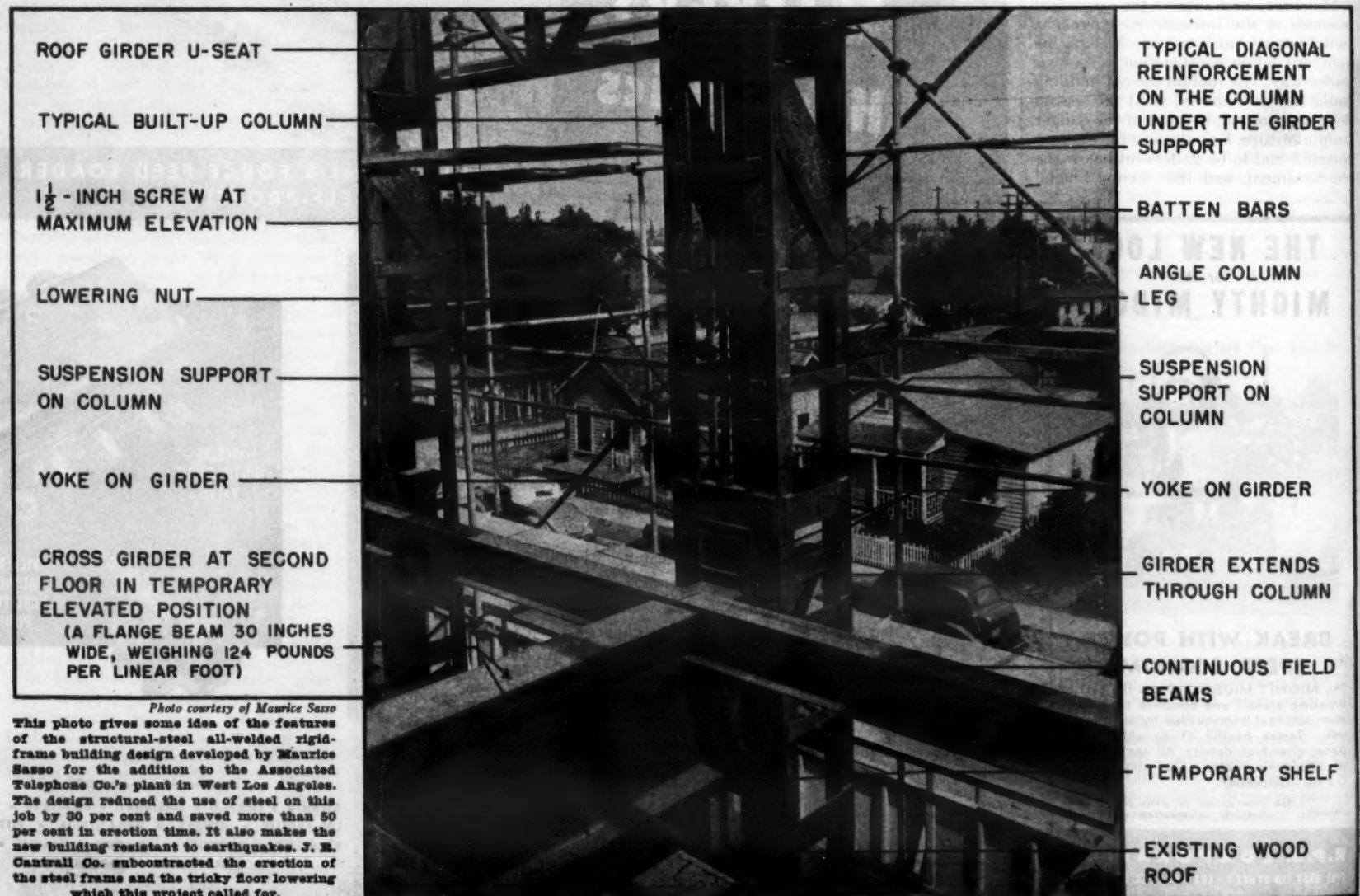
While the floor steel was suspended 65 inches high, the girders were fastened to the columns by means of welded safety straps which could be cut loose when the floor lowering began. The entire scheme consisted of pouring the floor high, then getting under it and removing the old building roof, and then lowering the steel and concrete section down on the screwed bolts to its permanent location.

Plywood-faced concrete form work was bolted onto the steel girder members, and the Rocklite-aggregate concrete was poured in the same way as the rest of the concrete in the building. Concrete was batched by the Consolidated Rock Products Co. of Los Angeles and sent out to the job in truck-mixers. The material was then dumped to the tower bucket on the job, and a Jaeger utility 2-drum hoist raised the concrete up to the pouring level. Concrete buggies then took the material from a transfer hopper and carted it around over the pour. The mix was internally vibrated as it was placed, and the floor surface was finished off with wood hand floats.

"With the 212-ton floor poured, we faced a real problem", said Sasso. "The contractor demanded some kind of assurance of non-liability, in case something went wrong and the heavy section got away from us."

"Insurance, even at the exorbitant

(Continued on next page)



This photo gives some idea of the features of the structural-steel all-welded rigid-frame building design developed by Maurice Sasso for the addition to the Associated Telephone Co.'s plant in West Los Angeles. The design reduced the use of steel on this job by 30 per cent and saved more than 50 per cent in erection time. It also makes the new building resistant to earthquakes. J. H. Cantrall Co. subcontracted the erection of the steel frame and the tricky floor lowering which this project called for.

rates for coverage, was not the answer. Insurance would take care only of the money loss. How about the possible loss of life, the damage to all this equipment, and the possible interruption to valuable communications service? For we knew people would have to work in the telephone office while the floor was being lowered.

"The only possible answer was the use of some safety device which would be ironclad proof against damage, should something go wrong".

Many things could go wrong, too. Sasso worried as he contemplated all kinds of possibilities. Suppose the threads on one of the bolts should strip. Suppose one or two of the bolts had imperfections not apparent to the eye. Suppose one of the men on the wrenches went a little faster than the others. Sasso had already anticipated this last possibility, by positioning the nuts so the handle of the wrench would catch the angles of the column, permitting only one-third of a turn at each application of the wrench.

Sasso thought about putting jacks underneath, but suppose the floor dropped and a jack tipped. It was no good. He thought about it for hours, and finally hit on the right solution for a cost of only \$25!

He had the carpenters cut 2-inch timbers of the proper dimension to slip in the column. These 2-inch pieces were piled in each column, on top of the steel shelf. On top of each pile a piece of 1-inch board was placed. When the straps were cut loose and the wrenches began to lower the floor, men at each of these points pulled out the 1-inch board. The floor would then be lowered until it almost touched the top 2-inch piece, at which time it could be removed and the 1-inch piece again inserted. This common-sense safety device kept the girder within an inch of the wood blocking at all times, and turned out to be the ironclad device he had sought to keep the floor under control even though something went wrong with the bolts.

Finally everything was ready. Seventeen workers were on hand to man the wrenches, each 6 feet long, and reinforced by a pipe handle. Three men were hired as spares, to spell the others as they got tired. The foreman gave the order to cut the safety straps, and cutting torches spluttered and flashed eerie shadows. A photographer, hired by Sasso to record the operation, adjusted his movie camera and slipped a flash bulb in his Speed-Graphic still camera.

At a whistle signal, the 17 men twisted the nuts down one-third of a turn, lowering the massive slab 1/24 inch. By this time, of course, the old roof underneath had been cleared away, leaving only the plywood boxed-in protection. The under side of the concrete slab had even been painted with three coats of its permanent paint.

As the husky guys heaved on the wrenches, the big slab slowly eased down towards its permanent position. Other men continued to remove wood safety blocks from time to time. She went down beautifully until she was within one inch of grade. Then the nut at the northwest corner column twisted loose when its threads stripped.

But it wasn't even a major crisis.

A welded plate was quickly set in place to hold a hydraulic jack. The jack took up the load, and the one corner was lowered the rest of the way in that manner. They didn't even have to bother getting a new bolt and nut made. As the floor slipped downward, engineers checked the level of the slab about every 2 hours to make certain it was going down evenly. After two days of work, the big girders came to rest on the plates inside the columns, and that was that.

The idea had worked beautifully.

Once it was in place, welders then went to work anchoring the girder to the plate, as a part of the rigid-frame all-welded design.

Later on, the columns were formed easily with plywood, and concrete was placed inside the steel. The outsides of the columns and walls were fire-proofed with a thin coating of pneumatically applied concrete, anchored to steel mesh.

The total dimensions of the new telephone building are 133 x 96 feet—con-



C. & E. M. Photo

This general view of the Associated Telephone Co.'s new building shows the tower which hoisted the concrete to the pour, and pedestrian protection at street level.

siderably larger than those of the old structure. The old building was constructed about 35 years ago. Since then, various additions have been con-

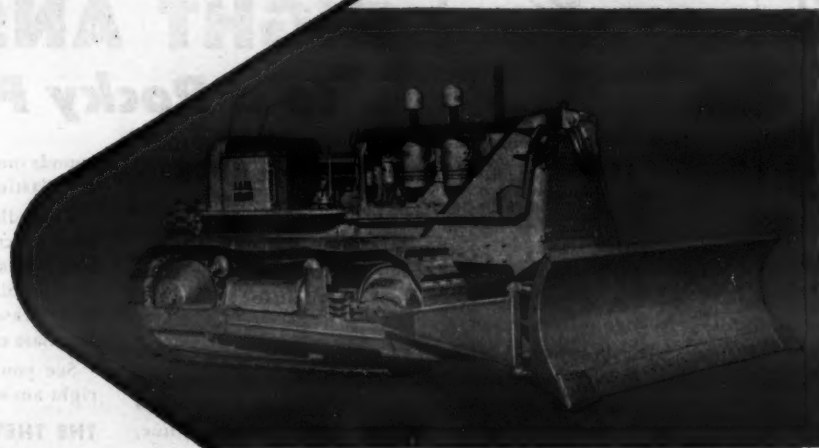
structed at different times to house additional central-office telephone equipment and long distance telephone (Concluded on next page)

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Type "AFB" Bulldozers and Type "AFT" Trailbuilders for use with Allis-Chalmers Tractors.

"QUARRY-TYPE" BULLDOZERS AND TRAILBUILDERS NOW AVAILABLE FOR ALLIS-CHALMERS HD-19 TRACTORS



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Use "Messenger" Service

Some exclusive territories now open for dealerships.

Heavy Slab Lowered By a "Screwy" Scheme

(Continued from preceding page)

operators to meet the ever-increasing demand for telephone service. This job makes the fourth operation, and should take care of needs for some time to come. Should another floor be wanted later on, Sasso's structural columns are readily available at the roof, where they could be extended.

"The excellent cooperation of every man and every contractor cannot be over-emphasized", said Sasso, in disclaiming somewhat the importance of his design in this tough, unusual job. "Simply by working together in fine fashion, everyone made the job go along smoothly".

Personnel

Mr. Sasso was in general charge of design and construction, with F. L. West as his welding representative. Ed Ferguson, an experienced old-time builder, was General Superintendent for Beyer & Abrahamson, with T. M. Cockrell as office clerk. H. M. Hentschke represented the Associated Telephone Co. in the capacity of Building Inspector.

Maurice Sasso has designed many other southern-California structures, including Devils Gate Dam, Big Dalton Multiple Arch Dam, the St. Paul Hotel, several apartment houses, office buildings, hospitals, and many of the county buildings. He assisted in the design of the new Los Angeles Hall of Justice Building, and recently finished a telephone building in Long Beach, in which a novel type of all-welded structural-steel frame system was used with great success.

Lift Boom for Paver Holds at All Angles

A HighLift boom for use with the MultiFoote concrete pavers has been developed by The Foote Co., Inc., 1916 State St., Nunda, N. Y., subsidiary of the Blaw-Knox Co. It is available for use with the Singlemix 34-E or Duomix 34-E pavers. The HighLift boom is controlled from the operator's platform, and can be held in any position above the ground, the manufacturer points out. It will provide a bucket clearance of 23 feet.

The HighLift boom is designed to in-



Here is the HighLift boom for use with MultiFoote concrete pavers.

crease the adaptability of the paver for use on a variety of work including parapets, bridge abutments, retaining

walls and footings, and walls for general building construction. It permits much falsework to be eliminated, the

company says, and it saves time in handling and loading concrete.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

Elevating-Conveyor Data

A catalog sheet on the construction and operation of Bosworth elevating conveyors is available from the Bosworth Mfg. Co., 6723 Denison Ave., Cleveland 2, Ohio. The Bin-Veyors are available in lengths of 6 to 30 feet and in widths of 8 or 11 inches. Elevations up to 18 feet can be obtained by the use of adjustable standards.

One photograph in the catalog sheet shows the Bin-Veyor by itself, and another shows it in use loading 100-pound sacks of material. The sheet tells about the power units and types of belts available. It also lists general information on Bin-Veyor features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 114.



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WHEN rock or other tough digging conditions "play hob" with production, look to Lorain for the answer to your problems.

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rounds out the operation. Its job at the moment—"secondary blasting" with a skullcracker.

Regardless of the type of work, you'll find Lorain will meet exacting job requirements and insure smooth, low-cost operation. All machines provide for complete interchangeability of boom equipment and feature 2-speed chain drive crawlers. Also available are Lorains which offer an alternate choice of highly mobile rubber-tire mountings.

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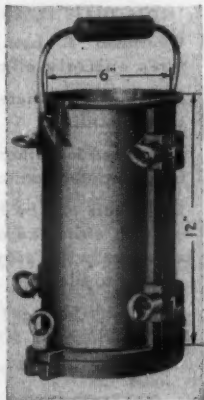
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Heavy Grading Marks A Highway Relocation

**Over 3,000,000 Yards
Of Excavation Handled
By Three Contractors
On U. S. 22 Job in Pa.**

IN western Pennsylvania, a narrow stretch of U. S. 22 with sharp horizontal and vertical curves is being reconstructed on new location. This Pennsylvania Department of Highways' project is located in Westmoreland County, and runs from a point near New Alexandria, at the junction of U. S. 119, west through Export, which is about 20 miles east of Pittsburgh.

The job involves over 3,000,000 cubic yards of excavation—also a reinforced-concrete pavement, two major bridges, and several smaller structures. Besides the work on U. S. 22, a section of State Route 66 is also being rebuilt south towards Greensburg from the new cloverleaf intersection at U. S. 22 and State Route 66. The entire project covers nearly 19 miles. Three contractors are engaged on this section of the William Penn Highway.

The eastern portion of the project, which is described in detail in this article, was awarded by the Highway Department to the Frank Mashuda Co. of Milwaukee, Wis., on its low bid of \$1,246,149. This 3.6-mile stretch runs west from New Alexandria and stops just west of Five Points.

The middle contract continues west along U. S. 22 for 4.5 miles, and is being built by the W. L. Johnson Construction Co. of Columbus, Ohio, for \$1,816,322. A separate contract with W. L. Johnson—for \$1,319,320.76—includes 5.9 miles of relocated Route 66 which runs north and south across U. S. 22. Where they intersect, 1¼ miles south of Delmont, a traffic interchange bridge will carry the Federal highway over the state route. The structure and cloverleaf intersection are part of this contract.

On the west 4.7-mile portion of the work, the State awarded a contract to the Latrobe Road Construction Co., Inc., of Latrobe, Pa., on its low bid of \$2,351,867. This figure included the building of a 3-span continuous I-beam bridge carrying the highway over tracks of the Pennsylvania Railroad.

Practically all the grading, including the major fills on the three contracts, was completed by the end of the 1948 construction season, while the concrete paving will be laid during 1949. The estimated total cost of the big project is \$5,414,339.

Old Narrow Pavement

The original concrete pavement on U. S. 22 was only 18 feet wide, with an 8-6-8-inch cross section; on State Route 66 the pavement was also only 18 feet wide. The new alignment does not follow the old road. On the Mashuda contract the new location touches the old road only where it crosses it in two instances. Over the center and west contracts, the new road lies south of the old, and by-passes the towns of

Delmont, White Valley, and Export. On the new route the maximum grade is 5 per cent, and no curve is sharper than one degree.

On U. S. 22 the plans call for a 33-foot reinforced-concrete pavement of 9-inch uniform thickness laid in 11-foot lanes. The center lane has a ½-inch crown, while the outer lanes have a 2-inch straight slope to the shoulders. In fills the shoulders are 10 feet wide and in cuts they are 8 feet; they slope at the rate of ½ inch to the foot. Fill slopes are 1½ to 1, with the cut slopes varying from 1½ to 1 to ¾ to 1. The pavement will be reinforced with bar mats placed 2 inches below the surface. Expansion joints will be placed at the P.C. and P.T. of curves, with the contraction



C. & E. M. Photo

A LeTourneau UP 30-yard Carryall pulled by a Caterpillar D8 tractor is push-loaded by an Allis-Chalmers HD-19 tractor. The Frank Mashuda Co. used these units on its 3.6-mile grading contract.

joints laid out on 62½-foot spacing. The adjoining concrete lanes are to be tied together with longitudinal dowels set on 5-foot centers. For the work on State Route 66, the pavement varies from 18 to 22 feet in width and is flanked by 8-foot shoulders.

The pavement is to be supported on

a 6-inch course of special subgrade material—in this case, slag. The slag will be spread a foot beyond the edge of the pavement on both sides, making the base width 35 feet. The slag is graded from 4-inch size down to fines, and will be delivered to the project in

(Continued on next page)

THE TIGER BRAND SPECIALIST SAYS—



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paid off big!"**

"Usually when I show up on the job, I hear all the 'gripes' about wire rope but today it was different. This contractor got rid of the bugaboo of early rope breakage and saved himself thousands of dollars. He was feeling so good, he even slipped me a cigar."

"He's done everything in his power to minimize wear and breakage of wire rope by keeping the condition of his equipment right up to 'snuff'. And he's got the best bunch of shovel runners you ever saw. They certainly know how to handle these machines without abusing the rope."

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On the Latrobe 4.7-mile portion of the work on U.S. 22 in western Pennsylvania, a Gradall (above) pulls material down a slope and a 15-yard Terra Cobra (right) gets under full steam after being push-loaded by a D8.



Heavy Grading Marks A Highway Relocation

(Continued from preceding page)

trucks from the blast furnaces in the Pittsburgh area. Most of the slag work is scheduled for 1949 along with the actual paving operations. The slag will be spread with dozers and rolled by smooth-wheel rollers before any concrete paving is placed. Final shaping will be done by the motor graders.

Frank Mashuda Co. Contract

On the east 3.6-mile Mashuda contract, the unclassified excavation totaled close to 700,000 cubic yards, of which about 35 per cent was shale and rock. The highest fill was 65 feet and the deepest cut was 123 feet. The latter was in a sidehill cut, and was measured from the top of the backslope to the ditch line. The dirt work was mostly in clay. Beneath that were strata of hard brown shale, gray shale, slate, and finally sandstone in the bottom layers of the cuts. The depth of rock rarely exceeded 16 feet.

The job got under way in April, 1948, and the first operation consisted of stripping the topsoil from the construction area in both cuts and fills. This was done to an average depth of 4 inches. In fill sections the original ground was further torn up and plowed to a 1-foot depth in order to obtain a good bond with the new embankment. The trees on the right-of-way were small enough to be pushed over easily, roots and all, by a couple of Caterpillar D8 tractor-dozers. Adjoining property owners helped themselves to the larger worthwhile timber, while the remaining smaller stuff and brush was dozed into piles and burned. A D8 fitted out with a brush rake pushed the material to a Lorain 40 crane with a 30-foot boom and an Owen clamshell bucket. The bucket had long built-up teeth to ease the work of picking up and piling the larger-size bushes and trees.

Cuts and fills balanced out on the earth-work diagram, but to avoid a long haul of 2 miles the contractor elected to waste some material at the east end of the job and borrow some for the west end. While the earth work was in progress, the drainage structures were also being built. Of reinforced-concrete construction, 7 of these larger types were sublet to two contracting companies—the Latrobe Road Construction Co., Inc., of Latrobe, Pa., and the A. R. Coffeen Co. of Decorah, Iowa. The structures varied in length from 88 to 324 feet, having spans or arches of from 4 to 32 feet. They were completed by August.

Grading

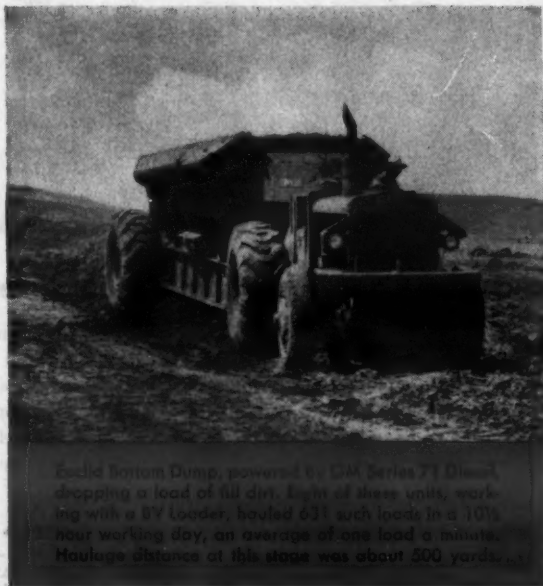
A goodly portion of the job consisted of sidehill fills which were usually benched out with dozers. There were 7 Caterpillar tractor-dozers in use on the cuts and fills—6 D8's and a D7. At the toe of slopes a line of 6-inch tile was laid in trenches dug 15 inches wide and 12 inches deep. This drainage took

care of the seepage from both the natural ground and the new fill. Ditches were also dug into the original ground at least 3 feet back from the top of the (Continued on next page)

Garrison Dam, under construction on the Missouri River near Garrison, North Dakota, will be the world's largest rolled-fill earth dam. When completed, the dam will be 210 feet high and over 2 miles long with a base width of nearly half a mile—a total fill of more than 70,000,000 cu. yds.



A load a WITH GM



Loaded Bottom Dump, powered by GM Series 71 Diesel, dropping a load of fill dirt. Eight of these units, working with a D7 loader, hauled 631 such loads in a 10 1/2 hour working day, an average of one load a minute. Haulage distance at this stage was about 500 yards.

ON the world's largest rolled-fill earth dam near Garrison, North Dakota, records for moving dirt are being smashed every day.

Bulk of the heavy equipment on the Garrison Dam project is powered by General Motors Series 71 Diesel engines. GM Diesels were selected for this job because—as the contractor puts it—"They can move dirt faster."

Reasons for this superior performance are obvious. GM Diesel engines are

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WIRE ROPE



WITH WALKER HIGH SPEED CHAIN

FOR THE HEAVY DUTY

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FOR THE HEAVY DUTY

slope in order to check erosion from storm water washing down the sides of the cuts. These trenches are 18 inches wide at the bottom and 18 inches deep, and have $1\frac{1}{2}$ to 1 side slopes.

The ditches were dug and the slopes on the job were trimmed by a Gradall, a hydraulically controlled versatile earth-mover with a telescoping boom. The Latrobe Road Construction Co., Inc., also used a Gradall on its westerly section of the project. Working from the roadbed, the Gradall rounded off and trimmed the $1\frac{1}{2}$ to 1 backslopes in the cuts by extending its boom with the 9-foot grader blade at the end, and pulling the material down the slope to the ditch line.

A good variety of equipment was brought to the job to meet the economic requirements of sound earth moving. For long hauls up to $\frac{1}{2}$ mile, 4 LeTourneau Super C Tournapulls with LP Carryalls averaging 15 yards were used. Along with these were 3 Wooldrige Terra Cobras averaging 16 yards each. For shorter hauls, tractor-scraper



C. & E. M. Photo

Here's a general view of grading operations on the Mashuda contract near New Alexandria, Pa. The large hill in the background is being cut down to furnish material for fill in the foreground.

units were employed on distances up to 1,000 feet. Nine LeTourneau Carryalls were at work on this phase of the grading, including 7 RU scrapers averaging 30 yards a trip, and 2 LP scrapers averaging 15 yards. They were all pulled by D8 tractors. The shale and

tough material in the cuts that were moved with these machines were first loosened by a LeTourneau K30 Rooter pulled by an Allis-Chalmers HD-19 tractor. Both the self-propelled and tractor-drawn scrapers were assisted in loading by HD-19 and D8 push tractors.



Garrison Builders, Inc., operators of this equipment, are working on the 14 million yard stage-one contract on the west side of the river. Shown is a convoy of four Euclid Bottom Dumps approaching the embankment fill area.

minute...

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2-cycle—with power on every piston downstroke. They deliver a smooth, steady power output—twice as many power impulses for each revolution of the crankshaft. This added power-per-turn makes them more compact with more horsepower for their size than other type engines. They start instantly on their own fuel. Their simplified construction and clean design make maintenance much

easier. Service problems are greatly simplified by the interchangeability of parts.

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MULTIPLE UNITS...Up to 800 H.P.

Rock Work

On the rock excavation the holes were drilled chiefly with three Ingersoll-Rand wagon drills, with a couple of I-R Jackhammers also on the job. Air was supplied from 4 I-R compressors: one at 500 cfm, two at 315 cfm, and one at 105 cfm. Drill steel $1\frac{1}{4}$ inches round was used in lengths of 6, 12, and 18 feet as a rule, with I-R bits from $2\frac{3}{4}$ down to $1\frac{1}{4}$ inches in size. Holes were generally drilled on 10-foot centers both ways, and charged with Atlas Gelodyn No. 1 dynamite. Because of farmhouses close by in the vicinity, the number of holes blasted at one time was limited to 30. The broken-up rock was loaded out by a Bucyrus-Erie 43-B $2\frac{3}{4}$ -yard shovel into a fleet of 5 end-dump Euclids averaging 11 yards a trip.

On the fills the dirt was spread in 4-inch lifts and compacted by a LaPlant-Choate 3-drum sheepsfoot roller pulled by a D8 tractor. The broken shale did not lend itself readily to such thin-layer compaction, and much of the rolling over that type of material was done by the smooth-wheel rollers. The rock was placed in 12-inch lifts, and larger pieces above that size were broken up after being dumped on the fill. Two cranes—a Northwest 25 with a 45-foot boom and a Lorain 41 with a 30-foot boom—were each equipped with a 4,200-pound cast-steel weight for breaking up the rock as it was placed. The cranes moved over the fill dropping their weights on the large rock chunks in the lifts.

Dirt was mixed in with the rocks on the 12-inch lifts, and each lift was compacted by the smooth-wheel rollers. There were 7 of them on the job—all Buffalo-Springfield 10-ton 3-wheelers. The rolling was done systematically, with the machine moving over only the width of the big wheel on each pass.

The contractor worked a week of six 9-hour days when the weather permitted, but throughout the spring and early summer the ground was so wet that the usual work week was only 3 or 4 days. Despite the bad weather, about 400,000 yards of dirt was moved between April and August. As the work progressed, the bulk of the earth-moving equipment was gradually taken off the job for use elsewhere. A Caterpillar No. 12 motor grader shaped the fine grade during the day, and at night worked on the haul roads to keep them in shape.

Equipment Maintenance

After every 9 hours of operation, each piece of equipment on the job was greased. This was done right out on the road with a Alemite grease unit mounted on a GMC 6 x 6 truck. A Wisconsin gas engine drove the I-R compressor which supplied air to the grease rig. Gulf gasoline and diesel fuel were stored in two 3,000-gallon tanks along the job, and the equipment was refueled from a GMC 6 x 6 tank truck.

The major items in the Mashuda contract include:

Excavation	692,534 cu. yds.
Special subgrade material	75,000 sq. yds.
Reinforced-concrete pavement	72,924 sq. yds.
Concrete for structures	3,810 cu. yds.
Reinforcing steel	462,237 lbs.

The work of the Frank Mashuda Co. was supervised by Victor Mashuda, Superintendent. The concrete paving will be done by the Allegheny Asphalt & Paving Co. of Pittsburgh, Pa.

Other Contracts

On the center W. L. Johnson Construction Co. contract, the grading was sublet to the Ralph Myers Contracting Co. of Salem, Ind. Earth-moving equipment included 12 LeTourneau Carryall-D8 tractor combinations, 8 Euclid end-dumps, 3 shovels, 2 cranes, 12 dozers, and 6 three-wheel 10-ton rollers. The prime contractor built 22 structures and the grade-separation

(Concluded on next page)

Heavy Grading Marks A Highway Relocation

(Continued from preceding page)

bridge at the cloverleaf interchange, and will also handle the paving operations. The major items in the Johnson contract, divided into the work on U. S. 22 and State Route 66, are as follows:

	U. S. 22	State Route 66
Excavation	633,994 cu. yds.	507,099 cu. yds.
Special subgrade material	147,865 sq. yds.	121,166 sq. yds.
Reinforced-concrete pavement	102,996 sq. yds.	76,855 sq. yds.
Concrete for structures	4,476 cu. yds.	
Reinforcing steel	586,022 lbs.	
Structural steel	358,000 lbs.	
Concrete piles	1,342 lin. ft.	
Timber piles	3,656 lin. ft.	

For the W. L. Johnson Construction Co., Paul Scott is Superintendent and R. M. Tangeman is Assistant Superintendent.

On the westerly Latrobe contract the bulk of the dirt-moving was done by 6 Wooldridge 15-yard Terra Cobras, and 2 Wooldridge 12-yard scrapers pulled by D8 tractors. This contract included the overpass over the railroad. The chief contract items were:

Excavation	1,253,412 cu. yds.
Special subgrade material	139,426 sq. yds.
Reinforced-concrete pavement	97,242 sq. yds.
Concrete for structures	8,231 cu. yds.
Reinforcing steel	466,402 lbs.
Structural steel	612,000 lbs.

J. B. Brownfield was Superintendent on the dirt-moving for the Latrobe Road Construction Co., Inc.

Highway Personnel

For the Pennsylvania Department of Highways, Howard B. Hoffman was Resident Engineer on both the east and west contracts, while Richard P. Hill was Resident Engineer on the center contract. The project is under the direction of J. P. Ambler, District Engineer of the Pittsburgh District in which the work is located. The Department is headed by Ray F. Smock, Secretary of Highways, and E. L. Schmidt, Chief Engineer, Harrisburg, Pa.

Hydraulic Boosters Ease Steering Effort

Steering boosters for use with trucks, wheel tractors, motor graders, and other wheel-mounted construction equipment are made by the Garrison Mfg. Co., 1506 S. Santa Fe Ave., Los Angeles 21, Calif. The Garrison hydraulic power boosters are sold as package units and can be installed in the field, the manufacturer states.

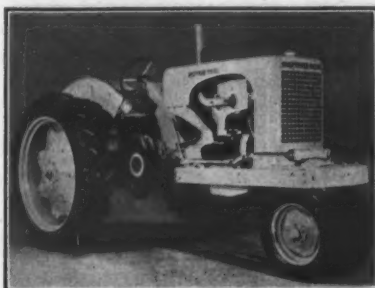
The boosters are designed to increase the flexibility of equipment by easing steering effort; to give safety protection by eliminating wheel fight and kick-back, and protecting against road shock; to lessen front-axle and steering-gear wear; and to step up performance by reducing the operator's fatigue and increasing the ability to turn wheels under loads.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.

Wheel Tractors Have Diesel Power Units

Diesel-powered wheel tractors are now available from R. H. Sheppard Co., Inc., Hanover, Pa. The Sheppard tractors are made in three models: the SD-1 is powered by a 1-cylinder air-cooled Sheppard diesel engine; the SD-2 by a 2-cylinder Sheppard diesel; and the SD-3 by a 3-cylinder Sheppard diesel.

Among the features common to all three models are a power take-off which is independent of the motion of the tractor; a hydraulic-lift system said to handle any implements using a 3-point suspension; electric push-button starting; and a standard transmission which permits operation at



Sheppard's new diesel-powered wheel tractors come in three models—the SD-1, SD-2, and SD-3. They are powered by 1, 2, and 3-cylinder Sheppard diesel engines, respectively.

speeds of from 2.71 to 10.70 mph. An 8-speed auxiliary transmission permits speeds of from 1.60 to 10.71 mph.

Features claimed for the Sheppard-built diesel-engine power units are a simplified fuel-injection system with only one moving part; economy of operation; a precision governor offering close regulation of all speeds; a cooling system with thermostat by-pass con-

trols; and simplicity of design and construction.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 126.

Mobile Excavators, Cranes Described in New Catalog

Wheel-mounted excavators and cranes in two models are described in a 20-page catalog issued by The Byers Machine Co., Ravenna, Ohio. Listed in Form No. 1248 are the ½-cubic-yard Model 61-W and the ¾-cubic-yard Model 71-W Traveler units. These are convertible for use as shovel, crane, clamshell, dragline, or back hoe.

The catalog features a double-page bird's-eye view of the Byers Traveler, which locates the various parts of the machine. Parts fully discussed and pictured in other sections of the catalog include the mobile chassis with its 27-foot 6-inch turning radius, the heavy-duty Timken Detroit axles, the upper-deck machinery, the Airflex clutches,

major shaft assemblies, and others.

A detailed description is included of the dipper and other attachments available for use with the basic machine. The catalog also has many large job photographs of Travelers in use on various types of projects.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 74.

Cyanamid Co. Promotions

Several personnel changes are announced by the Explosives Department of the American Cyanamid Co. William T. Dove succeeds Thomas Dove as Pottsville, Pa., District Manager. T. B. Dunn succeeds J. C. Evans as Bluefield, W. Va., District Manager. J. J. Freeman is assigned to the Bluefield office as a salesman. P. H. Johnson replaces J. G. Roberts in the Contractors' Section at Pittsburgh, Pa. Messrs. Thomas Dove, Evans, and Roberts are continuing with the company in an advisory capacity.



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broadcasts every
Saturday afternoon.



TEXACO

Speed Selector Is Added to Soil Mixer

A selective speed transmission is now provided on all motorized Pulvi-Mixers, according to an announcement by Seaman Motors, Inc., 305 N. 25th St., Milwaukee 3, Wis. It is designed to permit selection of the rotor speed best adapted to a particular type of job.

The manufacturer points out that the selective speed transmission permits pulverization to a greater depth, the mixing of aggregate of larger diameter, better pulverization of stiffer clays, and more thorough blending of stonier soils. It is also said to cut down on time breakage and normal wear and tear on the machine.

The Seaman Pulvi-Mixer is described as a high-speed rotary mixing implement developed to perform various soil-mixing operations. These include pulverization, mixing soil with blending materials, soil-stabilization work, preparation of shoulders for receiving grass seed, consolidation work in dams and

highway fills, and other similar operations.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 62.

Additive for Concrete

A liquid additive designed to improve concrete, cement plaster, or cement mortar is described in a folder distributed by Hopper Products, Inc., 12 E. 41st St., New York 17, N. Y. Portite is described as a long-chain high-molecular neutral organic compound in an aqueous solution. It is said to be non-contaminating, non-irritating, and non-toxic.

The bulletin lists 14 advantages said to accrue from the use of Portite, and describes them in detail. They include controlled air entrainment, reduction in water requirements, improved workability, elimination of segregation, reduction in bleeding, increase in bond to steel, reduction in shrinkage and finishing time, increase in strength, and



C. & E. M. Photo
Rigger Superintendent Cy Joyce, left, discusses some problems of gate installation at Santa Fe Dam with subcontractor J. E. Cantrall.

others. The folder is illustrated with on-the-job photographs.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.

16 Hydraulic Gates Are Installed in Dam

(Continued from page 1)

coastal plain, has been a long time building. The first contract for its construction, before the war, was terminated by the WPB. The next contract called for completion of the dam, but the steel shortage was still so acute that the installation of service gates in the outlet works was held up until this year.

The 16 gates are operated by hydraulic pressure inside control cylinders, and are designed to block and release the flow of the reservoir through the 16 conduit tubes, each 6 x 9 feet, in the outlet structure. Each gate weighs about 50 tons when completely assembled. There are no ungated openings in the Santa Fe Dam outlet works, and the spillway is a fixed-elevation concrete structure with a baffle-filled stilling basin and derrick-stone protection for a short distance below the spillway cutoff.

Construction of Santa Fe Dam will regulate the winter-flood flows of the San Gabriel, and furnish flood protection to residential and industrial areas below the dam.

Subcontracts Are Let

The Guy F. Atkinson Co. planned to install all concrete and grout, but beyond that point many of the items were subcontracted.

Manufacture of the sixteen gates went to Willamette Iron & Steel Co. of Portland, Oreg., an Atkinson subsidiary company. A rigging subcontract for the installation of the gates was let to the J. R. Cantrall Construction Co. of Arcadia. Piping and control works went to Lohman Brothers, Inc., a plumbing company of Los Angeles which boasts of no leaks since 1892. And the electrical work went to Berg Electric Corp. of Los Angeles. Steel reinforcement was furnished by the Blue Diamond Corp. of Los Angeles.

Before leaving the Portland shops of Willamette Iron & Steel Co., each gate was assembled, match-marked, and tested. They were then shipped by rail to a siding at Kincaid, near Azusa, Calif., where the pieces were unloaded by a Lorain Moto-Crane and transferred to flat-bed trucks. These machines then hauled the gates out to the dam, where they were unloaded on the heavy concrete apron just upstream from the trash racks.

Installation Time Important

The ever-present possibility of early autumn rains made it imperative that the erection or installation time be cut down as much as possible. The installation schedule was set up generally to take care of the gates as fast as they could be finished at Portland and shipped to California. In order to meet this tight schedule, a gate had to be received and installed in from three days to a week.

At the suggestion of Herbert Gray, an experienced construction engineer assigned by the Corps of Engineers to the project, Rigger Superintendent Cy Joyce built up five special dollies mounted on tiny 5-inch roller-bearing turret wheels taken from a battleship. These dollies were then used to carry the heavy pieces from the trash-rack columns back through the outlet tubes to the point of placement. The dollies were pulled by a manila rope reeved through block and tackle off one of the niggerheads on the 2-drum gasoline hoist used to lift the pieces to position.

A Gate Is Installed

The installation of each gate was similar, because there was only one efficient way to work in the cramped space of the block-out. Survey points had previously been established, as a reference for line and grade of each gate, in the

(Continued on next page)

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RUST is a constant threat to drill operating efficiency — and a common cause of high maintenance cost. *Texaco Rock Drill Lubricants EP* protect against these dangers whether your drills are running or idle.

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how effective lubrication can assure you longer drill life, faster drilling and lower maintenance costs. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For greater compressor efficiency, keep valves clean, rings free, air lines clear by lubricating with *Texaco Cetus*, *Alcaid* or *Algal Oils*. For heavy-duty service and wet conditions, use *Texaco Regal Oils (R & O)*. Your Texaco Lubrication Engineer will recommend the ones best suited to your requirements. Keep your hydraulically-operated construction equipment working more efficiently—systems free of rust and sludge—by using *Texaco Regal Oils (R & O)* as the hydraulic mediums.

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inder.

The cylinder was then raised at a 45-degree angle, telegraphed over, and turned in the air until it hung vertically over the bonnet. It was then lowered until the piston rod slid neatly into the proper opening in the gate leaf, and the lower flanged face of the control cylinder rested snug and tight against the upper face of the bonnet. Huge nuts were then snugged in place around the end of the piston rod after it had been forced back down to the point where the gate leaf was to be picked up.

Now the gate was complete. It was tested by raising and lowering the gate leaf. Then permanent steel braces were welded in to hold the gate steady and prevent its further movement.

Concrete was then placed around the gate in three lifts. The first pour filled up the underside of the conduit liner, extending about 6 inches up its sides. The second pour carried halfway up to the vent pipe, and the third pour was finished off at the level of the gate-room floor.

The Santa Fe gates have piezometers installed as part of the permanent works, in order that the flow of water can be measured and recorded. Placing concrete around the small 1/4-inch-diameter copper tubes required a great deal of care, but all the pours were successfully made without damaging one of the small tubes.

The concrete was hauled by truck-mixer from Graham Brothers commercial plant near the dam, and hauled out to the control house. The concrete was dropped down from the gallery floor through elephant trunks, vibrated by internal-type Viber electric vibrators, and finished off at the gate-room floor by trowels.

The same procedure held true for the installation of the other 15 gates, which were all completed before the first rain of the year.

Throughout the entire job, Rigger Superintendent Cy Joyce operated without a mishap. Joyce, an old-time rigger who is still at the game because he loves it, is a specialist in the erection of heavy hangar doors and the like. According to Army engineers on the Santa Fe Dam job, the rigging was unusually well handled from the standpoints of both speed and caution. No piece was ever picked up unless there were plenty of wood softeners between the cable and the piece. No load with a safety factor of less than three was ever picked up. No load was ever permitted to swing when in the air. The process was a slow, gentle one, which paid off in the long run because it really speeded up the work.

Personnel

Santa Fe Dam was designed and supervised under the general direction of the Los Angeles District Office of the Corps of Engineers, of which Colonel A. T. W. Moore is District Engineer. The job at field level was under the general direction of Senior Engineer J. G. Morgan, with Herb Gray as Resident Engineer.

Bob Boyd was the General Superintendent for Guy F. Atkinson Co., Bob Fitzgerald directed all piping work for Lohman Brothers, and Cy Joyce was in charge for J. R. Cantrall Co.

New Dallas Office for P&H

Construction is under way in Dallas, Texas, on a new office and warehouse for the Harnischfeger Corp. It will serve the southwestern territory of Texas, Oklahoma, and New Mexico. The building is located in the Trinity industrial area, and will provide over 10,000 square feet of floor space for equipment and parts storage. Address of the new P&H building is 2223 Commerce St. It is managed by James Enochs.

P&H products include arc welders and electrodes, power shovels, truck

cranes, electric excavators, single-pass soil stabilizers, and electric cranes and hoists.

Buckets in Three Styles

Descriptive literature on a line of dragline buckets is being distributed by the Yaun Dragline Buckets & Mfg. Plant, P. O. Box 1508, Baton Rouge, La. The Yaun buckets are made in perforated, shell, and basket types, and in light, medium, and heavy-duty strengths.

The Yaun catalog illustrates each of these types in detail and lists the principal advantages claimed for each. It also stresses the general features claimed for all Yaun buckets—more payload, faster dumping, and less dead weight. The catalog contains several photographs of the bucket in various stages of its cycle—loading, swinging, and dumping.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 110.

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Chip Spreader Box Fits Any Dump Body

A spreader box for use with dump trucks is manufactured by the Claude C. Wood Co., P. O. Box 599, Lodi, Calif. The Easy-Open chip spreaders are 8 feet in width, and can be attached to all standard dump bodies. They are one-man-operated and can be used to spread rock chips, sand seal coats, and similar materials.

A feature of the Wood chip spreader is the gate which opens to full width. Tension on the handle holds the gate open or closed as set. The ends of the sill under the dump body are cut off to eliminate spillage; this permits the box to sit snugly under the body, and does not damage the truck, the manufacturer explains. Steel pegs are welded to the end of the dump-body sill, and the spreader box is hung on these pegs through holes burned in it. Once the box is hung on these pegs, the operator is free to adjust the side chains without supporting the weight of the box.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 107.

Engine-Starting Aid For Cold-Weather Use

A fluid to improve cold-weather starting of gasoline or diesel engines is announced by the California Oil Co., 350 Fifth Ave., New York 1, N. Y. The Chevron starting fluid is a product of the California Research Corp. Both companies are wholly owned subsidiaries of the Standard Oil Co. of California.

The Chevron fluid is basically an ethyl-ether compound. Its use has been simplified by packing it in gelatin capsules. The capsules are available in either 7 or 17-cc sizes. They are used with a special puncturing tool and priming system designed to inject the fluid into the intake manifold.

According to the manufacturer, the fluid is non-corrosive and will flow at temperatures as low as 70 degrees (F) below zero. Additives in it act as a lubricant as the engine is started.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 79.

Crushers Are Described In a Series of Bulletins

Catalogs describing several types of crushers are available from the Rogers Iron Works Co., 3913 Charles Block, Joplin, Mo. These include roll crushers with chain or belt drive, primary or secondary jaw crushers, steel-wheel-mounted trailer crushers, crushers with bucket elevators, and others.

Bulletin R-321 describes the Rogers roll crushers. It lists their construction features, capacities, horsepower ratings, settings, and reduction ratios. It also illustrates the crushers and their principal parts, including countershaft,



The gate of the Wood Easy-Open chip spreader opens full width and will stay open or closed as set. It is 8 feet wide and can be attached to any standard dump body.

shell, core assembly, etc.

Bulletin C-304 describes the Rogers primary jaw crushers which are made

in six sizes, and the secondary, in twelve sizes. It tells what to consider in selecting the proper crusher for a

particular job, lists the construction features of the jaw crushers with either bronze or roller bearings, presents an operator's guide for selecting a jaw crusher, and tabulates specifications on general dimensions, operating characteristics, and sizes.

Also available: Bulletin T-40 on the trailer crushers; Bulletin B-120 on the crushers with bucket elevators; and another bulletin which pictures each piece of crushing, sizing, conveying, and storing equipment in the Rogers line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 68.

Klingler to Southwest

The Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corp. announces that E. L. Klingler will direct the sale of Wickwire rope in the area covering Houston and Abilene in Texas, and Tulsa, Okla. Mr. Klingler will operate from Houston. He was formerly located at Palmer, Mass.

Wouldn't YOU look happy, doing 4 days' drilling in 3?



On an excavation contract for 1,600,000 yards of approximately 60% limestone and sandstone rock, on U. S. Route 22 east of Pittsburgh, Ralph Myers Construction Co. replaced a good 500 ft. compressor with a "new standard" Jaeger 600 and immediately increased daily footage 35% to 40% with the same two wagon drills.

"I'm doing as much drilling in 3 days as I used to do in 4," says Ralph Myers, who now owns two Jaeger 600's.

Why? Because tools need more air today than they did back in 1932, when the old 60 to 500 ft. compressor ratings were established. 500 ft. of air maintains only 70 lbs. pressure behind two big wagon drills; with 600 ft. you step up pressure to a steady 90 lbs. at which drills will average as much as 40% more footage per hour.

You can get a comparable increase in production with any "new standard" Jaeger Air Plus. From the Model 75, that holds 90 lbs. pressure in a heavy pavement breaker, on up, every Air Plus rating is matched to the tools it is designed for. Ask any Jaeger user. Or go to your distributor who sells and rents "Air Plus" compressors and let him prove it on your job.

75 - 125 - 185 - 250 - 365 - 600 cfm at 100 lbs.

Why you can't match Jaeger ratings with any other compressor:

Jaegers, alone, have been designed with the much bigger valves, port areas, inter-coolers, air receivers and clutches, the balanced 2-stage compression and advanced force feed lubrication needed to convert the greater horsepower of today's

engines into more air power, at efficient, economical engine speeds. They had to be run at 20% to 30% slower piston speed than others (800 fpm) to hold them down to old ratings until modern engines became available in diesel to match gas.

NOTE: Because of "Fuel Miser" speed control, Jaegers use no more fuel than others when not delivering more air.

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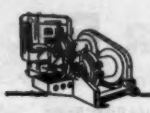
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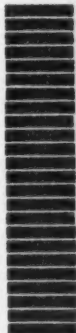
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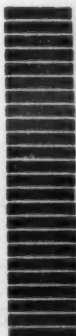
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Contractors and Engineers Monthly - Request Card - March '49

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Portrait in Print

By BILL QUIRK

"Up the Hard Way" Phrases the Story Of Clifford Strike, Builder Tycoon

WHEN it looked as though financial difficulties had thwarted his dream of a college education, Clifford Strike, then just a high-school graduate, began to teach himself engineering. Years later, when the paralyzing chill of the dark depression years seriously threatened the existence of the construction firm of which he was a member, the young engineer held doggedly on, though only he and the founder of the organization were left. And since then, time after time, even though physical obstacles have seemed impassable, Strike has managed to complete construction jobs he undertook within, or in better than, the allotted time. For his clients, whether in peace or war, whether one of the country's big businesses or Uncle Sam himself, have usually wanted what they wanted in a hurry.

Now only 46, Clifford S. Strike, President of F. H. McGraw & Co., Engineers and Constructors, heads one of the largest construction firms in the country. He got that college education he wanted; he kept the two-man business afloat despite the wave of stagnation that had engulfed contractors right and left back in the 30's; and he finally came on to establish a world-wide reputation for completing, satisfactorily, big building, industrial, or engineering construction projects, both civil and military.

As you can see from the accompanying photograph, snapped in his private office at company headquarters in Hartford, Conn., Strike looks intense, gives an impression of power, harnessed and controlled. The lean and hungry years are behind. And there were such years, for things didn't come easy to the rugged-looking president—rugged with 210 muscular pounds packed in a frame just a shade under 6 feet tall. Cliff Strike looks like an illustrator's concept of a professional football player. But he is a construction man in the full sense of the word, who knows as well how to operate any of the equipment to be found on the job, as how to pick structural details from a set of plans, or how to analyze costs from columns of figures.

Education—Informal and Formal

Strike hails from the midwest. He was born in Marion, Ill., a roistering town in the down-state coal fields. His father, who was associated with a public utility company, had a job that never kept him long in one place. As a result, the boy received his secondary education in various communities, and in 1919 was graduated from high school in Toledo, Ohio. After graduation he got a job as an electrician's helper in

a Toledo powerhouse, for a college education then seemed beyond the reach of the family's modest income. Having been tossed mostly by chance into the electrical industry, the young apprentice decided he would become an electrical engineer, college or no. He enrolled for a correspondence course in electrical engineering with the International Correspondence Schools, and tackled his lessons every night after work with grim determination to master them.

"I got a lot out of that course," Strike recalled puffing on a cigar. "It really taught me plenty. But by the fall of



C. & E. M. Photo

Clifford S. Strike, President of F. H. McGraw & Co., Engineers and Constructors, Hartford, Conn., likes his jobs big—the bigger the better.

1920, when I had gone about three-quarters through the lessons, my father was given a substantial promotion. With this upswing in the family for-

tune, together with the money I had saved from my job, I was able to enroll that September at the University of

(Continued on next page)

HANDY HARD-FACING KINK

with a bargain of up to 5 times more life!

TO MINIMIZE GRADER BLADE WARPAGE during hard-facing, experienced welders bolt two blades together, exposing the leading face of each for applying TUBE BORUM or BOROD.* Warpage of one is automatically compensated for by the other. Need for straightening is reduced and up to 5 times more service life can be expected than from unprotected blades.



HOW TO GAIN EXTRA GRADER BLADE LIFE

Apply parallel beads of 1/8" 20-30 ELECTRIC TUBE BORUM along bottom edge in a band 2" wide or less. Alternate the application of each bead between blades. Tube Borium assures a sharp cutting edge with maximum life under severest abrasive conditions.

This blade was protected with stringer beads of BOROD—a Stoddy Alloy similar to Tube Borium but with much finer tungsten carbide particles. Excellent results are experienced where both impact and abrasion are present.



TUBE BORUM and BOROD are two Stoddy Alloys composed of Tungsten Carbide particles encased in mild steel tubes. They differ chiefly in size of particles, BOROD deposits being almost homogeneous in character. Both these alloys, as well as all other Stoddy hard-metals, are available from your Stoddy Dealer. Ask him for literature and recommendations on your wear problems.

WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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STODDY COMPANY 1136 WEST SLAUSON AVENUE, WHITTIER, CALIFORNIA

"Up the Hard Way". Story of a Builder

(Continued from preceding page)

Illinois to study electrical engineering. During my first summer vacation I worked at a variety of jobs which included jerking sodas, pumping gas at a filling station, and even driving an ambulance. But it was still pretty rough going to meet the tuition fees at the start of my sophomore year.

"Between my second and third years, things picked up when I got my first real taste of construction with the Henry L. Doherty Co., a Cities Service affiliate. My job was that of general flunkie—holding the rod, keeping time, or checking material—but I was learning all the time while working on projects that took me out to Lincoln, Nebraska, and down to Amarillo, Texas. My boss, Cliff Ferguson, was a big help. He convinced me, for one thing, that I should switch from electrical engineering to either mining or mechanical engineering. Knowing my interest in construction jobs, he made me realize that the course in electrical engineering was much too limited and specialized to give me the kind of education I really wanted. Accordingly, when I returned to college in the fall I transferred to the mechanical-engineering department, and took as many electives in civil engineering as I could".

Versatile Student

Today the well trained engineer holds membership in the American Society of Civil Engineers (as well as in the American Society of Mechanical Engineers) although he received his undergraduate degree in mechanical engineering. Before the end of his college days the versatile Cliff Strike got a taste of a couple of other vocations in which he might very well have succeeded if he had not followed construction. One of these extra-curricular activities was politics. Strike was campaign manager in the successful election of his candidate as senior-class president. These political contests in the large midwestern universities are hurly-burly rat races, and as important to students as any national election campaign—in which most of them are too young to vote anyway.

The journalistic field, too, lost prize material when Strike stuck to engineering, for his other college-day occupation was with the *Daily Illini*, the university newspaper. He worked on it during his last three college years, and during his senior year was its Business Manager at a \$100-a-month salary. This last job was nearly a full-time one by itself, requiring six to seven hours daily of intensive work. While Strike was on the staff, the *Daily Illini* was the first college paper to join the national Audit Bureau of Circulation.

"It seems to me I spent all my waking hours on the job", Strike observed. "Our paper was a regular daily from every angle. It was published 12 months of the year, ran as many as 20 pages an issue of 8-column 21-inch full-size sheets, and contained Associated Press wire-service news. It had a circulation of around 5,000 and we competed seriously with the local newspapers of Urbana and Champaign, Illinois".

Romance and Work

His journalistic activities threw Strike into contact with Ida Marie Pollitt, an attractive brunette, also an Illinois student, who doubled as Society Editor for one of the local papers. They were married in August, 1924, two months after Strike received his degree from the University. Before graduation he had been signed to a position with Dwight P. Robinson & Co., engineers and contractors from New York City, and in so doing, had passed up a newspaper post that offered him a

salary several times greater than did his first assignment as a graduate engineer.

"I started in the Purchasing Department", Strike related, "but I quickly managed to get out in the field on the big jobs. At first I was an instrument man, then a cost engineer, later an assistant superintendent, and finally a job superintendent. During practically all this time I was working directly under F. H. McGraw who was Construction Manager for the firm".

Frank H. McGraw was, and still is, one of the construction giants of this country. Now, at 78, he is Chairman of the Board of F. H. McGraw & Co., and heads the McGraw Construction Co. of Middletown, Ohio. He imparted much of his construction savvy to his young,

energetic assistant; then, in 1929, left the Robinson employ to found the present company bearing his name. The following year Clifford S. Strike joined F. H. McGraw & Co. as Assistant Vice President.

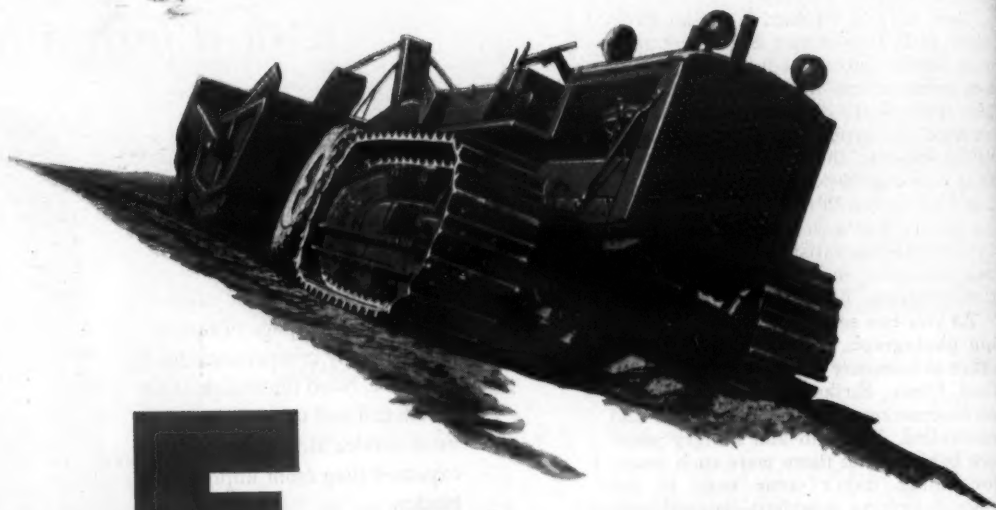
Wide Experience

Strike had gained much valuable experience in the six years after leaving college. He had built apartment houses, office buildings, hotels, theaters, power stations, railway shops, and industrial plants. The building boom of the Golden Twenties continued for a couple of more years for F. H. McGraw & Co. From its inception the young company knew what it was doing. It possessed the important construction know-how of its members, and with

the guiding touch of wise old F. H. McGraw, and the driving power and technical skill of Cliff Strike, backing was secured for big jobs right from the start.

The Terminal Warehouse Co. in 1929 awarded F. H. McGraw & Co. its first contract of \$9,500,000 for the engineering and construction of Harborside Terminal in Jersey City, N. J. With this warehouse the company built an adjoining \$2,000,000 pier for the Pennsylvania Railroad. Following this came the design and construction of a steel mill, including the installation of equipment, at Gadsden, Ala., for the Gulf States Steel Co.—a \$7,000,000 job. A short time later, in 1931, the fast-growing company, like all construction

(Continued on next page)



THE ENGINE THAT MOVES THE EARTH

When you buy earthmoving power, you buy the tools of the construction trade—crawler or wheel tractors, motor graders, draglines and shovels. The one common denominator of all is the engine. It gives get up and go to the equipment. It is the power that moves the earth.

When you buy and use earthmoving equipment, you buy and use the power of engines to work for you!

When you specify INTERNATIONAL Power, you can be sure of getting your full money's worth of power and performance. Diesel—or gasoline—International Engines are designed to give you dependable and efficient power. And they're built to the most exacting standards of the industry.

International full-Diesels give you features not found in any other Diesel. They

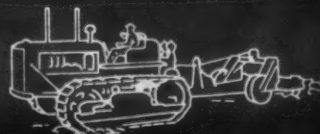
provide in-built, gasoline-conversion starting which gets International Diesels warmed up and on the job instantly. The International designed and built fuel injection system gives you unusually high combustion efficiency and excellent fuel economy. Rifle-drilled oil-pressure passages assure adequate lubrication for all working parts.

See your International Industrial Power Distributor for the facts about these features. Remember, he is equipped to give you superb service on all International-powered equipment which he sells... another reason why your best buy in earthmoving power is International.

INTERNATIONAL HARVESTER COMPANY
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CRAWLER TRACTORS
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DIESEL ENGINES
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INTERNATIONAL



firms, was hit by the depression.

"It was catch as catch can for awhile", Strike reflected soberly. "From an organization numbering in the hundreds we were reduced to two—F. H. McGraw and myself. We held on, and finally got some public-works construction that saw us through."

The latter included sewage-treatment plants in several municipalities, as well as some road building. In 1935 a most welcome job came along, for the design, construction, and installation of a cold-rolled strip mill for the American Rolling Mill Co. at Middletown, Ohio. This was followed by other work at that same location, extending from 1937 to 1947, and included additions to existing plants and erection of equipment.

Even a partial list of F. H. McGraw &

Co. projects from 1929 to date fills a thick book. It includes building, engineering and industrial construction, as well as a number of jobs that do not fall into any of the regular categories.

War Work

The company had its biggest years during the last war, when it handled more than \$100,000,000 worth of work at one time during 1942 and 1943. Two of its greatest achievements, under Clifford Strike's supervision, were the construction of the \$31,000,000 Jayhawk Ordnance Works at Baxter Springs, Kansas, in less than a year, and the \$36,000,000 Bermuda Naval Air Station. The latter was started in 1941 and was completed in 1943. Within the foyer doors of its main office in Hartford,

Conn., F. H. McGraw & Co. displays the two Army-Navy "E" awards it received for its work on these projects.

Other jobs within the company's 100 per cent war-activity program included the \$17,000,000 aluminum rolling mill for Reynolds Alloys Co. at Sheffield, Ala.; the \$7,000,000 modernization program of the U. S. Navy Submarine Base at New London, Conn.; and the \$12,000,000 Welland Chemical Co. ammunition project near Niagara Falls.

Because of the leading part he played in this war work, Clifford Strike in 1945 was appointed by the War Department "Chief of the Building Materials, Construction and Forestry Office of the Military Government for Germany (U. S.)". Only the Army could have dreamed up that mouth-filling title.

Shorn of the weighty verbiage, it meant that Cliff Strike was given the job of rebuilding certain vital non-war industries, and of providing temporary housing for some 4,000,000 homeless Germans in the American zone of occupation.

"I spent eight months in Europe during 1945 and 1946 on the staff of Gen. Lucius D. Clay, U. S. Commander in Chief", Strike said. "We put up makeshift housing units for 4,000,000 Germans. Understand, however, that they are very low-level shelters. Most cases involved simply throwing a roof over a bomb-damaged building with no attempt to provide heat, light, or water facilities. You would have to go back centuries to find a comparable level of existence. But with the enormity of the damage and the lack of building materials, we could do no better."

"The German people are the key to an integrated Europe", Strike went on. "If Germany is revived, the rest of Europe will revive too. The rehabilitation of German industry is made especially difficult because of the multilateral controls and Russian opposition. Despite these obstacles, production is increasing, but very slowly. I look to see some kind of unilateral rule in western Germany before too long, with the Germans governing themselves, and with England, France, and the United States exercising only limited controls. When these differences are settled, and a peace treaty signed, the German people can do much more for themselves in the way of industrial recovery."

"Eastern Germany? You'll have to look in a crystal ball to see what's going on there!" Strike added with a shrug.

European and Japanese Assignments

Strike's later appointment as U. S. Deputy Chief for Reparations made him the American member of a four-nation group which included English, French, and Russian representatives. This commission evaluated German industry as a preliminary step in carrying out settlements ordered by the Allied Reparations Commission. For his accomplishments on these vital assignments, Clifford S. Strike, by direction of the President of the United States, was presented with the Medal of Freedom, one of the highest civilian awards.

He returned to company affairs in 1946, but in January, 1947, the Secretary of War invited him to head a group of leading American industrial engineers and appraisers on a mission to Japan. The object was to make a field study of the steps to be taken to expedite early action on the Japanese reparations program. This group later was organized into the firm of Overseas Consultants, Inc., a non-profit company in which eleven firms are directors and of which Strike is President. The by-this-time international expert made another flying trip to Japan in November, 1947, to complete the last phases of the survey in preparation for his report to the War Department.

"What Germany is to Europe", Strike stated, "Japan is to the Orient—the key to industrial recovery and development. But Japan should progress more rapidly towards this end than Germany because of the unilateral control under Gen. Douglas MacArthur."

Peace-Time Work

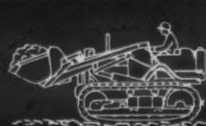
Even in civilian life, company business seldom permits Strike to stay long in one place. One of the more perplexing duties of his secretary, Mrs. Reynolds, a good-looking blonde, is keeping track of where her boss is from the involved itineraries he follows. If not at company headquarters in Hartford, Conn.—a trim two-story ivy-covered red brick building—Strike may be at branch offices in New York, Chicago, Pittsburgh, or Middletown, Ohio. Or, as is more likely, out in the

(Concluded on next page)



Listen to James Melton on "Harvest of Stars" every Wednesday evening—CBS

Industrial Power



"Up the Hard Way", Story of a Builder

(Continued from preceding page)

field on a McGraw contract. He gets around by company planes—either in the big twin-engine Beechcraft manned by a pilot and co-pilot, or in a smaller single-engine ship.

He and Mrs. Strike make their home in West Hartford with their daughter Connie, age 12. Their married daughter, 22-year-old Jennie Marie Watkins of Champaign, Ill., made grandparents of her father and mother this summer when George Thomas Watkins was born. Bringing up two girls never did give Mrs. Strike a chance to go back to the journalism she practiced at Illinois University. Those undergraduate political campaigns of her husband, however, developed in him a flair for self-expression, and he is much sought after as a speaker. He seldom has time for many speaking engagements, though, nor for the golf which he plays remarkably well with so little time for practice.

At present, \$40,000,000 to \$50,000,000 worth of contracts, which F. H. McGraw & Co. is operating, take up most of Cliff Strike's time. These range from domestic jobs in the U. S. A. to far-off New Guinea where the company is building 100 kilometers of roads for the Dutch Shell Oil Co. in its exploration work. Here in this country, on a joint venture with the Daniels Construction Co. of Greenville, S. C., the McGraw firm is constructing a \$30,000,000 paper plant for the Coosa River Paper Co. in Alabama. When completed, the plant will have a capacity of 450 tons of paper daily—300 tons of newsprint and 150 tons of bleached pulp.

New Developments

One of the greatest of the many projects on the McGraw roster is the \$12,000,000 coal-preparation plant now being built for Jones & Laughlin Steel Co. at East Fredericktown, Pa. This plant is an amazing revolutionary step in the industrial history of the United States. By means of the "sink and float" principle, metallurgical coal will be separated from steam coal. Metallurgical coal, the lighter variety, floats off for use in the blast furnaces, while the heavier steam coal sinks, and later serves as fuel for the boilers in power plants.

"The depletion of our coal reserves calls for something revolutionary", Strike explained. "With this heavy-media process, a full seam of coal is mined, and the high-quality coal is then separated from the other coal containing chemical impurities. The plant will have a capacity of 2,000 tons per hour. We started the job in October, 1947, and expect to finish it in June, 1949."

From the Jones & Laughlin Co.'s Vestaburg Mine, the coal will be brought out of the earth in cars and dumped on a conveyor belt. This belt will be carried across the Monongahela River on a new suspension bridge leading directly to the big processing plant. Topography, in the way of a high bluff, prevented building the plant on the same side of the river as the mine. After processing, the metallurgical coal will be dumped into barges and floated 50 miles downstream to the Pittsburgh steel mills. With such processing plants, experts predict that coal reserves for steel are indirectly extended as much as fifty years.

A few years ago, for a Christmas present, Cliff Strike's office staff gave him a framed pencil drawing showing sketches of key McGraw projects grouped around the company headquarters building in Hartford. It hangs on the wall of the President's private office opposite an oil painting of F. H. McGraw. Necessarily, only a few of the great construction projects, par-

ticular pets of Strike, could be illustrated on one sheet of paper. He takes understandable pride in these past achievements. But great competitor that he is, Clifford S. Strike never stops thinking and planning for the future—how to do big jobs better and faster. And the bigger they are, the better he likes them.

Aeration System Feature Of Bulk-Cement Trailer

A trailer designed especially for hauling bulk cement and other granular materials is described in a catalog prepared for distribution by the Gramm Trailer Corp., Delphos, Ohio. Feature of the Gramm trailer is an aeration system designed to make the cement flow during discharging operations at angles of as low as 4 degrees from the horizontal. The folder describes how the aeration system works, and lists several features of controls, discharge chutes, motor, blower, and other individual parts.

The Gramm trailer is available in

several models, and these are listed in the catalog. They include semi-trailer transport units with 300, 400, or 500-sack capacities; semi-trailer bulk-storage units with 800, 1,000, 1,200, 1,400, or 1,600-sack capacities; and truck-mounted transport units with 150, 250, and 300-sack capacities.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 45.

Film of Truck Roadoo

A 30-minute sound motion picture of the 1948 National Truck Roadoo finals is now available for showing. It covers the entire Roadoo program which was held in Washington, D. C., last autumn. Arrangements for showing the film to interested groups can be made by contacting Reo Motors, Inc., at Lansing, Mich.

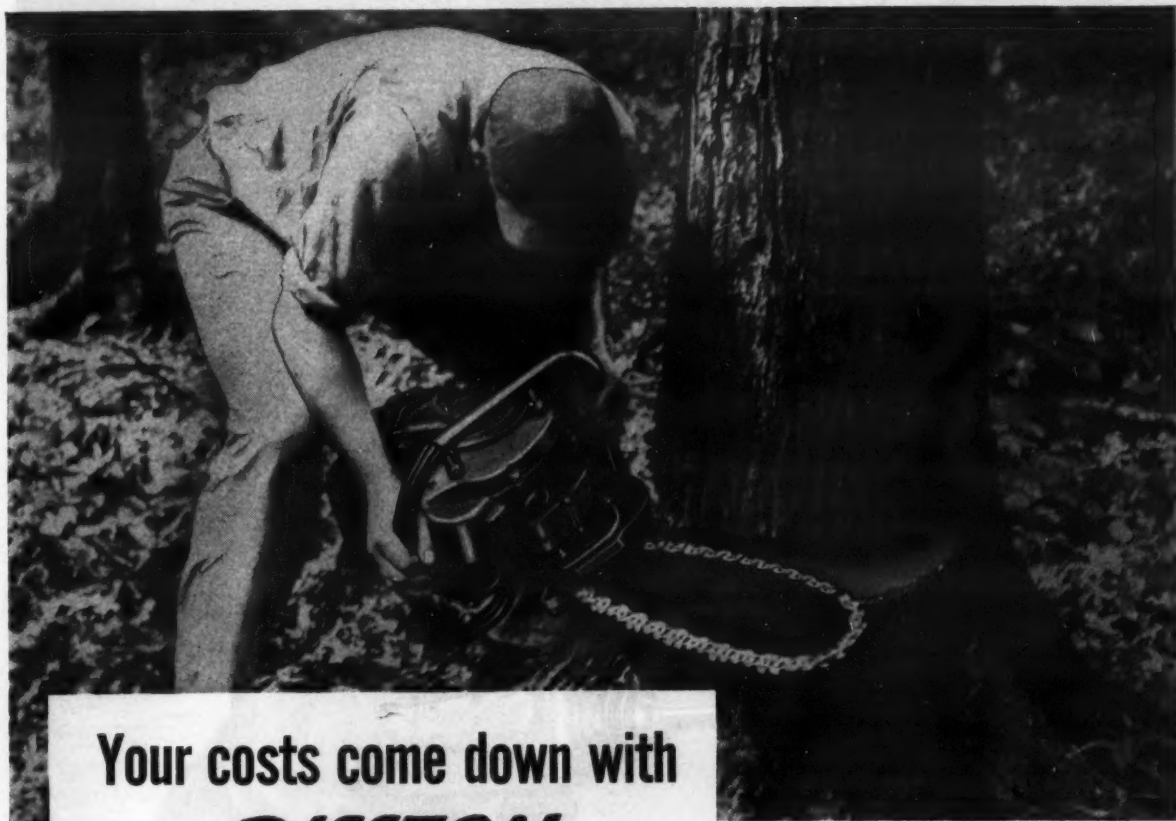


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HENKE MFG. CORP., Janesville, Iowa

Henke Rotary Power Sweeper

Designed for sweeping bituminous roads before retreatment, and removing excess screenings from base courses prior to surfacing. Also used in street sweeping and snow removal. 7 and 10 ft. sweepers available with patented full circle swing and 56 in. tread. 10 ft. sweeper consists of two 5 ft. oscillating cores.



Your costs come down with

DISSTON

ONE-MAN CHAIN SAW

Powered by the Mercury Gasoline Engine

Make the modern move to the Disston One-Man Chain Saw. Watch production soar and costs come down. In mere minutes this saw does the felling, bucking and limbing that used to burn up costly hours.

The Disston One-Man Chain Saw is dependable—light to handle and husky—has long life, anti-friction bearings and positive lubrication. Easily started in any weather. Easily, safely controlled, even when cutting at awkward angles and upside down! Never has modern power taken such a big bite out of the cost of cutting timber and lumber. A demonstration proves it.

Get in touch with your nearest Disston Dealer.
Or write direct for full information.

NEW DISSTON ONE-MAN BOW SAW FOR ADDED USES

No more pinch, drag and strain in the cut. Available as a complete unit (Price \$432)—or as an extra useful accessory (Price \$55 including chain). Quickly interchangeable with Disston One-Man Guide Rails, anytime—anywhere.



ALSO...The best value for bigger timber... The DISSTON EXTRA- DUTY TWO-MAN CHAIN SAW

This 12 hp. husky does tough jobs double-quick. The right saw for heavy work. Pivoted blade swings 360°—for handy cutting at all angles.

MAIL COUPON TODAY

HENRY DISSTON & SONS, INC.
374 Tacony, Philadelphia 35, Pa.

Gentlemen: Please send me full information on the:

- ☐ DISSTON ONE-MAN CHAIN SAW
☐ DISSTON TWO-MAN CHAIN SAW

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Canadian Factory:
2-20 Fraser Ave., Toronto 3, Ont.





The E-40 Tournarocker, a rear-dump wagon, has a 41-cubic-yard capacity. It is 12 feet high and its body is 16 feet 8 inches x 10 feet.

Earth-Moving Units In Three New Models

Three new earth-moving rigs are announced by R. G. LeTourneau, Inc., Peoria, Ill. They are the Model E-35 Tournahopper, the E-40 Tournarocker, and the E-25 Carryall scraper. All three machines can be used interchangeably with the same 240-hp 2-wheel prime mover.

The Tournahopper is a bottom-dump trailer and has a 27-yard, or 35-ton, capacity. It has positive electric power steering and will make a 90-degree turn, the manufacturer states. It can be equipped with 30 x 33 or 24 x 29 tapered bead tires, and when loaded, it carries 51 per cent of its weight on the drive tires. It has a power-proportioning Tournamatic differential said to channel power automatically to the wheel on firmest footing. The bottom-dump doors open somewhat the way a clamshell bucket does; maximum opening is 10 x 10 feet.

The Tournarocker is a rear-dump wagon with a 41-cubic-yard capacity. It is mounted on 24 x 29 tapered bead tires, and will make a 90-degree turn in an 18-foot radius, the manufacturer states. It has a 16-foot 8-inch x 10-foot body, and is 12 feet high.

The E-25 Carryall scraper features fingertip electric control, positive power steering, Tournamatic differential, a high degree of flotation, and sure-footed traction.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

New Brazing Fluxes

Four new fluxes have been developed by the Victor Equipment Co., 844 Folsom St., San Francisco 7, Calif. Victor No. 3 flux is for brazing brass and bronze, steel, and clean-cast and malleable iron. No. 5 flux is for moderate-heat brazing of cast and malleable iron, and for tinning dirty castings. No. 7 flux is for high-heat brazing of cast and malleable iron where the base metal will become exceptionally hot. And No. 9 is for fast, effective welding of cast iron; as the manufacturer points out, No. 9 will not cake when the container is subjected to moderately high heat.

These are the features claimed for the new fluxes: they will clean both the parent and filler metal; they will cling to the heated rod when it is dipped into the flux; they do not blow off the rod; they leave the finished braze clean; they contain no useless or toxic ingredients; they tin burned spots in cast-iron brazing; and they do not encourage cooling of cast-iron welds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 101.

Penn Drake Adds Two Men

Two men have been added to the Sales Department of the Pennsylvania Refining Co., maker of the Penn Drake line of petroleum and specialty products. These men are: L. Gordon Grinnell of New York and Donald E. Hodgson of Ohio.

Heavy-Duty Motor Grader Has 100-Hp Diesel Engine

A 100-hp motor grader is described in a catalog issued by the J. D. Adams Mfg. Co., 217 S. Belmont Ave., Indianapolis, Ind. The Model 610 is powered by a UD-16 International Harvester diesel engine. It has a weight of from 25,200 to 27,000 pounds, and 8 forward speeds ranging up to 25 mph.

Among the features described in detail in Catalog No. 485 are the high front-axle clearance, the fully reversible blade, the wide range of positions with the blade centered on circle, the long reach with the blade shifted on circle, the power steering, the all-welded frame, positive-action blade controls, heavy-duty tandem drive,

convenient operation and location of controls, the full-floating 2-piece rear axle which carries no weight but serves only to drive the machine, and the 100-hp diesel engine.

Each of these features is illustrated by a large photograph keyed to descriptive text. A double-page spread pictures the No. 610 in detail and lists standard equipment as well as total weights when the machine is combined with various attachments. The catalog also contains one full page listing specifications, and another showing optional equipment available for mounting on the No. 610 to increase its usefulness.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 55.



"You wouldn't ask 'why' if you saw this place after a heavy rain."

ALL AROUND AMERICA

At new Pier "N" in Norfolk, Va., modern equipment speeds unloading of 5-ton mahogany logs and lumber. On new or old cranes, on masts and booms, in the forests or at the docks, TRU-LAY Preformed steps up operations and reduces costs through longer, safer service.

This cableway speeds construction of new sewage facilities for Philadelphia. Other cableways build dams, carry any materials over yawning chasms. Cableways use several types of top quality wire rope. TRU-LAY is made in constructions for maximum cableway efficiency.

In a rolling mill in Baltimore, multi-ton machine parts are lifted with an overhead traveling crane, wire rope, and wire rope slings. TRU-LAY Preformed is the ideal rope for these powerful cranes, and ACCO Registered Wire Rope Slings provide the safe, connecting link.

Raising a jackknife derrick at Eunice, New Mexico. Cool skill and dependable wire rope do the job right. The same wire rope that lifts the drill pipe and casing is used for raising the derrick. A dual-purpose rope—that's TRU-LAY Preformed with improved plow steel wires.

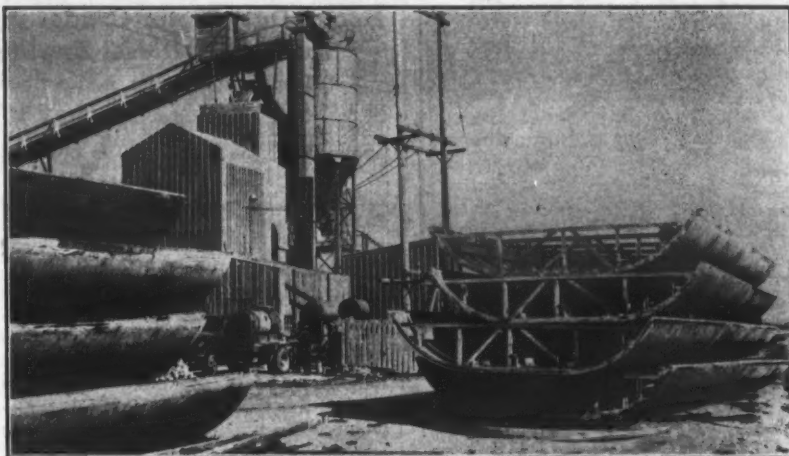
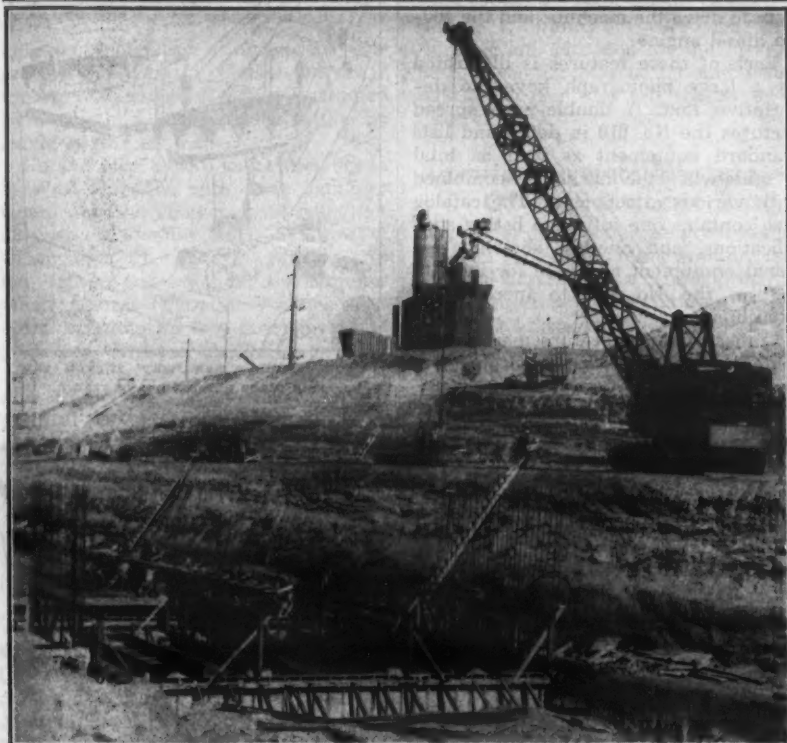
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**AMERICAN CABLE DIVISION
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In Business for Your Safety

**Tru-Lay
Preformed
Wire Rope**

OUTLET WORKS



C. & E. M. Photos

The photo at left shows the start of outlet-works pouring at Cherry Creek Dam. Flat-bed trucks brought the concrete from the plant in 2-yard buckets, and a crane swung the buckets out on location. The photo above shows the prefabricated steel forms used to pour the concrete barrel. The rest of the form work on the job was of lumber.

Concrete and Earth Placed in New Dam

Separate Contracts Rush Embankment and Outlet Works Towards Completion On Cherry Creek Project

By RAYMOND P. DAY,
Western Editor

✦ WORK on the Cherry Creek flood-control reservoir project near Denver, Colo., is going ahead rapidly under two contracts. The outlet structure is finished, and the Denver Office of the U. S. Engineers expects that work on the 12,000,000-yard embankment may be

completed by December 1 of this year.

The first contract, for constructing the cut-off trench and core wall, has been finished by Gordon-Bressi & Bevanda, of Los Angeles. An \$1,800,000 contract for the outlet works has been finished by the Al Johnson Construction Co. of Minneapolis. Embankment and spillway construction is being handled under an \$8,000,000 contract with Phelps-Wunderlich-James of Englewood, Colo., and Jefferson City, Mo.

The active contract, and the jobs already finished, are noteworthy because of late-model equipment and several

peculiar problems which have been solved.

History of the Project

Since early times, Cherry Creek has menaced inhabitants along its banks with the threat of sudden, violent floods. The Indians learned to choose camp sites well away from the unpredictable stream. But when gold was discovered in the sands of Cherry Creek, the white men gave little heed to the Indian's friendly warning. At the junction of Cherry Creek with the South Platte River, the city of Denver rose and grew and expanded.

On the night of May 19, 1864, the white men learned at first hand the savagery of the "Tiger of the Plains". No discharge records are available, but the flood claimed 19 lives and demolished buildings and bridges in the new frontier city. Several flood-control schemes were presented after this, but little or no action on them was taken. Subsequent floods, eight in all, have spurred the city to enlarge and wall the Cherry Creek channel. And the threat of floods exceeding anything of the past finally resulted, at the instigation of the late Congressman Lawrence Lewis, in Congressional aid.

The creek basin, extending southeast from its junction with the South Platte River in the heart of Denver, is about 57 miles long and 15 miles wide, with a drainage area of 414 square miles. The entire basin is subject to the cloudburst type of storm of high intensity and short duration. In the major storm of May, 1935, adjacent to and extending slightly over the basin, a weather station at the storm center reported 24 inches of rainfall in 6 hours.

Had this storm been directly over the Cherry Creek basin, the resultant flood of 113,000 cfs, far exceeding any of the others, would have overtopped any existing structure on the creek. Shortly thereafter, an \$800,000 dam was erected by PWA labor and money. Kenwood Dam, as it was called, will be demolished and incorporated in the present dam embankment.

The primary purpose of the Cherry Creek Project, then, is to provide complete protection to the city of Denver from floods on Cherry Creek. The project will also make available storage capacity for irrigation and other water uses. Later on, when the U.S. Bureau of Reclamation completes the Blue-South Platte Project, transmountain water will be stored in the Cherry Creek reservoir to supplement the existing water supply of the South Platte basin.

Design of the Dam

The dam will be a rolled-earth-fill structure rising 140 feet above the streambed. The selected impervious core extends from the top of the dam to the bottom of the cut-off, some 55 feet below the streambed. Pervious or sandy sections are provided for interior drainage of the embankment. More than half of the embankment will be random material placed to support and anchor the selected material. The finished dam, including the cut-off, will contain about 13,000,000 cubic yards of earth. The upstream face will be covered with 18 inches of riprap on a sand blanket, and the downstream face will be covered with topsoil and seeded.

The reservoir, at maximum operating pool level, will extend 4½ miles upstream and will have an operating capacity of 185,000 acre-feet. The surcharge capacity of 90,000 acre-feet between spillway-crest elevation and maximum operating pool level will be used for regulation and control of flood waters.

The outlet works, consisting of intake structure, conduit, and stilling basin, contain about half the total concrete which will be used in the job. The intake tower is 174 feet high, and will contain the five 6 x 9 foot slide gates and operating mechanism. A trash-rack structure will abut the tower on the upstream side. The conduit is approximately 22 feet high, 44 feet wide, and 710 feet long. It contains a circular center tube 12 feet in diameter

(Continued on next page)

C. & E. M. Photos

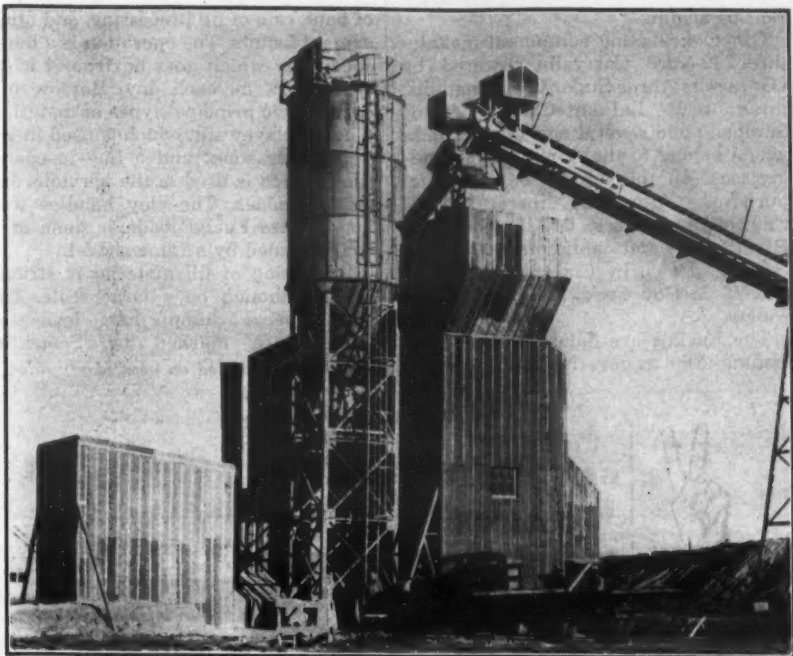
EMBANKMENT



On the Phelps-Wunderlich-James contract for dam embankment, a Euclid loader with Allis-Chalmers HD-10's fore and aft loads to a bottom-dump Euclid which deposits the material in neat windrows on the fill.



After the material is leveled to a 6-inch lift, a 5,500-gallon-capacity water-tank truck pulled by a Caterpillar DW10 sprinkles it.



C. & E. M. Photos

For cold-weather concrete work on the outlet structure, Al Johnson Construction Co. enclosed this Noble CA-154 batching plant, Smith concrete mixer, and water-storage tank in a wood and tar-paper house heated by steam. Aggregates and sand reached the plant via a long conveyor from stockpiles near by.

and two side tubes 8 feet wide and 12 feet high. At the downstream end of the center conduit a hollow jet valve will control irrigation releases. The stilling basin, designed to reduce discharge flows to less than scouring velocity in the escape channel, contains training walls and baffles and varies in width from 53 to 100 feet, with an overall length of 165 feet.

The spillway canal is an open, unlined cut—12,000 feet long and 67 feet wide at the bottom—through a low ridge northeast of the dam. Water passing through this flat cut will discharge into Tollgate Creek, and thence to Sand Creek and the South Platte River, completely by-passing the city of Denver.

The dam when completed will be 14,300 feet in length, 30 feet wide at the top, and a maximum of 1,200 feet wide at the bottom. It will have four zones.

Deep-Well Unwatering

Perhaps the most unusual phase of the Gordon-Bressi & Bevanda contract was the unwatering of the core-trench area with deep-well pumps, and the use of wellpoints locally in the bottom of the core trench. Fourteen water wells, drilled to depths of 40 to 105 feet, were used. Seven of the wells were spotted in the two deepest channels over the Denver sandrock formation, while the remainder were mostly upstream from the trench.

In addition, the Army Engineers had about 50 observation wells to assist in plotting the unwatering progress. These wells were scattered throughout the area, and showed a drawdown of the water table to a point 55 feet below the original ground surface.

The wells were drilled with 36-inch rotary drill rigs, and cased with per-

forated steel pipe. The intake suction for 6 and 8-inch Worthington pumps were then centered in the casing, and the casing was packed outside with coarse gravel. Electric power was brought in on a local transmission line to keep the pumps at work. Excellent results were obtained. A small well-point system was used in the very bottom of the core trench when excavation reached that level.

Excavation Starts Outlet

Men and equipment of the Al Johnson Construction Co. moved in on June 5, 1947, to start the contract on the outlet works. A long, deep trench had to be excavated to a point below water level to make room for the conduit barrel and stilling basin. The formation was a hard, bedded sandy shale, but dug successfully with the aid of rooters.

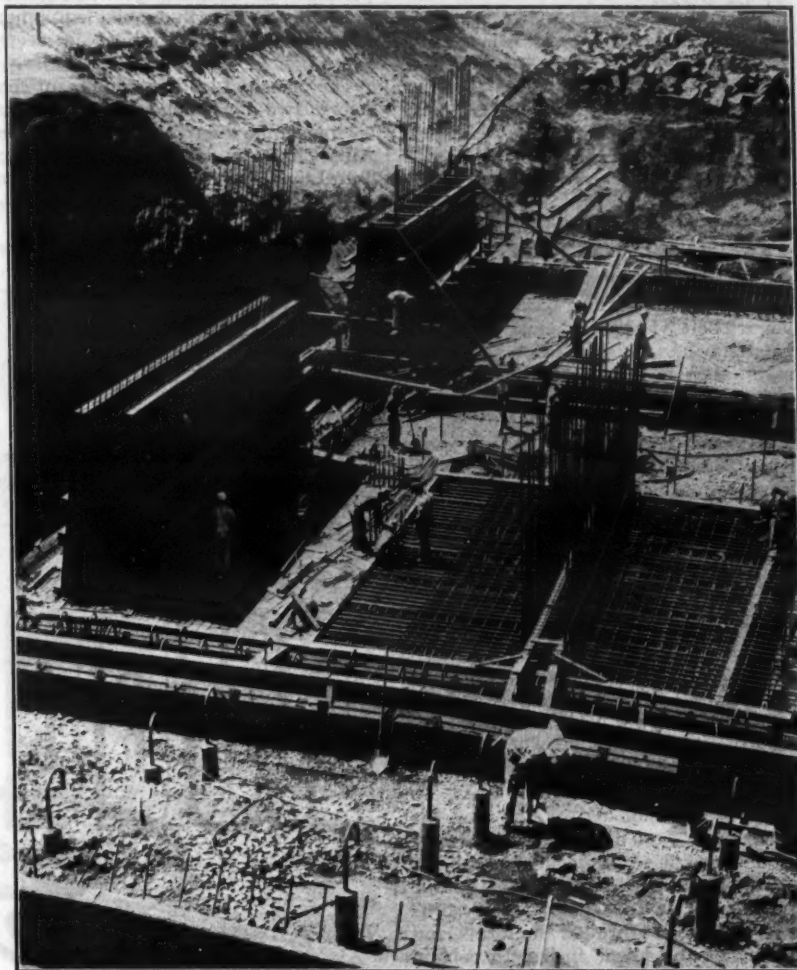
Ten Super C Tournapulls were used for this work. The machines dug the material out, hauled it an average distance of about 500 feet, and wasted it in a storage area near the outlet works. A berm was built about halfway down to permit access to the concrete work, and the concrete-pouring crane later used this accessway for its work.

Cold-weather concrete work was one of the unusual features of this contract. Faced with a tough pouring schedule, Al Johnson's men planned a set-up of the concrete batch plant which would whip the rigors of cold weather. According to the specifications no concrete could be placed below 32 degrees. But suffice it to say that concrete work went on intermittently through the winter, to the satisfaction of contractors and engineers alike.

A Noble CA-154 fully automatic batching plant was brought in and set up near the outlet works. It was a



This general view from a point over the outlet works shows completed concrete, with work going on at the uncompleted control house in the background.



Here steel is being set and forms erected for the stilling basin, which will reduce discharge flows to less than scouring velocity in the escape channel.

new plant, equipped with water scales and Noble batch-recording machines on both scales. The plant was set up over a Smith 2-cubic-yard concrete mixer, and the entire works was enclosed in a warm house of lumber covered with tar paper. In this house were located also a 125-hp steam boiler and a 3,000-gallon water-storage tank fitted with steam coils.

Aggregate bins were also equipped with steam coils to prevent the material from freezing, and a portable set of steam coils was rigged up outside in

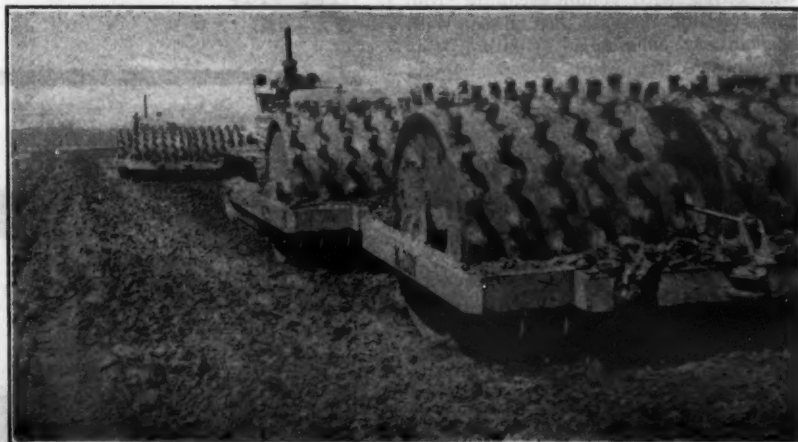
the sand pile. The plant was so set up that 55-degree concrete could be run from it in the coldest weather in which inspectors would permit pours to be made.

Sand for the concrete came from Sullivan, Colo., only a few miles from the job. Granite aggregates from Golden, Colo., were used for the coarse material. Three sizes of coarse aggregate, one size of sand, cement, water, and Protex air-entraining agent made up the mix.

(Continued on next page)



Then an Allis-Chalmers tractor with bulldozer makes a fast pass through the lift. The scarifier frame on the rear of the tractor is lowered during this operation.



Finally, twin McCoy sheepfoot rollers take off on the lift to get 96 per cent of standard density. The contractor had 18 of these units on the job.



C. & E. M. Photo

USED inspectors on the Al Johnson contract for Cherry Creek Dam outlet works required all scale and concrete to be chipped and brushed from the reinforcing steel.

Concrete and Earth Placed in New Dam

(Continued from preceding page)

Aggregates and sand, stockpiled on the ground near the plant, reached the Noble bins by means of a long conveyor belt. Fully automatic weighing by the Noble plant turned material in to the Smith 2-yard mixer every 2 minutes. The mix consisted of 1,095 pounds of cement, 2,270 pounds of 1½-inch rock, 2,600 pounds of sand, and 1,580 pounds of ¾-inch rock. The large 3-inch cobbles were used in the heavier pours. Ten ounces of Protex air-entraining agent were added to every 2-yard batch of concrete.

The air-entraining agent was introduced just ahead of the water, so the water would flush the line clean and give the Protex some mixing at that point. The air-entraining agent made the concrete much more workable, especially on pours where heavy steel mats were installed.

Except for the conduit barrel forms, which were of prefabricated steel, all forms were made of lumber. For the most part 2 x 6 tongue-and-groove lumber was used for facing, with 2 x 6 studs on 12-inch centers, and double 3 x 6's for wales. Richmond Tyscrus were used to tie through the forms, and to anchor the lower forms. In certain areas where the concrete would be exposed, Hydron absorbent form lining was used.

After forms were set, the pours were cleaned thoroughly with air and water and sandblasting, and the reinforcing steel was wire-brushed. The concrete arrived at the job in 2-yard Garbro concrete buckets on flat-bed trucks. The buckets were picked up and swung out on location by a Northwest 80-D crane. The concrete was vibrated by Chicago Pneumatic vibrators. Concrete surfaces, even in the stilling basin, were floated; no steel-trowel work was done.

During the cold weather, the concrete was cured with steam escaping from pipes under canvas tarpaulins. With the advent of warmer weather, this system was discontinued and stripped pours were cured with Sealtech concrete-curing solution. This was con-

siderably easier to apply and met the exacting requirements of Corps of Engineers specifications.

Other equipment on the Johnson contract included an American ¾-yard crane for feeding the conveyor line, a Lorain Moto-Crane for stripping forms and other odd jobs, an International TD-18 with a Bucyrus-Erie Bullgrader around the batch plant, and an International ID-9 and Hough front-end loader for general pick-up work and minor structural excavation.

Mike Grippo was General Superintendent for Johnson, with Ben North as Steel Superintendent.

Embankment Excavation and Fill

Work on the earth embankment, by Phelps-Wunderlich-James, features perhaps one of the largest and newest fleets of heavy earth-moving equipment assembled on one project in recent years.

The principal loading equipment consists of two new Euclid 54-inch loaders, each machine towed and pushed by new Allis-Chalmers HD-19 diesel tractors. Two Lima 1201 machines, one rigged as a 3½-yard shovel, the other as a 3½-yard dragline, are also used.

A new Model 200-W Bucyrus-Monighan 5-yard walking dragline is being used to recover sand from Cherry Creek, and will later be used to complete the 3,000,000 cubic yards of excavation in the spillway. This machine carries an Esco perforated bucket on its 125-foot steel boom.

The main hauling units consist of a fleet of 38 Euclid 22-yard bottom-dump wagons. These wagons have been equipped with sideboards on the right-hand side, to prevent earth from the loaders from spilling off the outboard

side in loading.

Other excavating equipment includes three 12-yard Carryalls powered by D8 tractors; three Super C Tournapulls; three new LaPlant-Choate Moto-Scrapers; and several end-dump trucks which belong to the Army and are being used on the job for experimental purposes. Altogether there are 20 Caterpillar tractors, 6 Allis-Chalmers HD-19's, 5 water tanks of 5,500-gallon capacity drawn by Caterpillar DW10's, and 18 McCoy heavy-duty sheepfoot rollers.

The Euclids are balanced under the loading units as governed by the length

of haul, rate of fill processing, and other general factors. The operation is a high-speed one which goes on from 4 a. m. until 10 p. m. each day. Borrow pits contain two principal types of material: a heavy clayey silt, which is used in the impervious zone; and a fine-to-coarse sand, which is used in the pervious and random zones. The clay handles well for the two Euclid loaders; some of it is also loaded by a Lima shovel.

Processing of fill material is strictly routine, though on a large scale. The earth-movers dump their loads on range lines marked by Scotchlite

(Concluded on next page)



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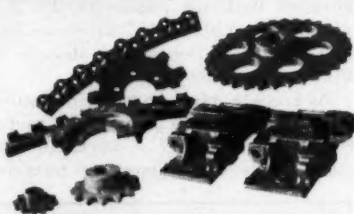


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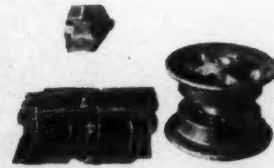
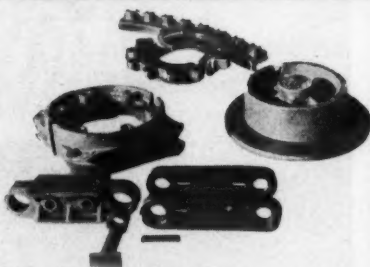
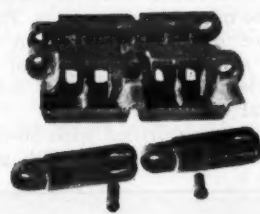
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C. & E. M. Photos

At left, A Bucyrus-Monaghan Model 200-W walking dragline excavates sand from the Cherry Creek channel on the Phelps-Wunderlich-James contract. On the same contract, a LaPlant-Choate Moto-Scraper (above) races towards the fill as sheepfoot rollers in the background tamp dirt already placed.

squares. Bulldozers quickly level the material to 6-inch lifts. The big water-tank trucks then apply water. The bulldozers again pass through the lift and lower the scarifier frame hanging on the rear of the tractor. When the right moisture content is in and mixed, the big McCoy rollers tamp the material to 98 per cent of standard density. Very little difficulty is being encountered in getting this result.

Portable light towers are used for night work, and each piece of equipment is greased once each shift. Mobile lubricating units visit equipment in the field, and a large repair shop is also maintained.

Personnel

The Cherry Creek Project is being supervised under the direction of Col. Craig Smyser, Denver District Engineer, with Sam G. Neff as Head of the Construction Division and Paul F. Jensen as Resident Engineer.

New Slide Films on Safety

A series of six sound slide films has been released by the National Safety Council. They are entitled "Human Factors in Safety". Each film deals with one aspect of the art of handling people. They show supervisors how to train new workers, how to keep experienced workers alert, and how to win the respect, cooperation, and loyal support of their men.

The six films are entitled, "The Secret of Supervision", "Teaching Safety on the Job", "People are Alike", "Everybody's Different", "Teamwork for Safety", and "Safety Case Histories". The films are printed on 35-mm film, and the record accompanying them is designed for use on phonographs with a turntable speed of 33 1/3 rpm.

Further information can be secured by writing to the NSC at 20 N. Wacker Drive, Chicago 6, Ill.

Data on Gyating Screens

Gyating screens for use in aggregate-producing plants are described in a 12-page catalog issued by the Simplicity Engineering Co., Durand, Mich. The catalog contains a photograph of a typical Simplicity screen to which detailed descriptions of its features have been keyed. These include the lubricated roller bearings, counterbalanced

eccentric shaft, opposed rubber corner supports, adjustable angle setting, 4-way tension on the screens, double-crowned surface, low-head-type screens,

and all-steel construction.

Bulletin No. 48 contains other photographs which show the Simplicity gyrating screens in use on a wide variety of jobs, including gravel plants, stone quarries, and river dredges. A diagram of a typical plant set-up shows how the various screens can be com-

bined to provide complete separation of materials according to their grain size. The catalog also lists all the screens in the Simplicity line—with their principal dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 115.

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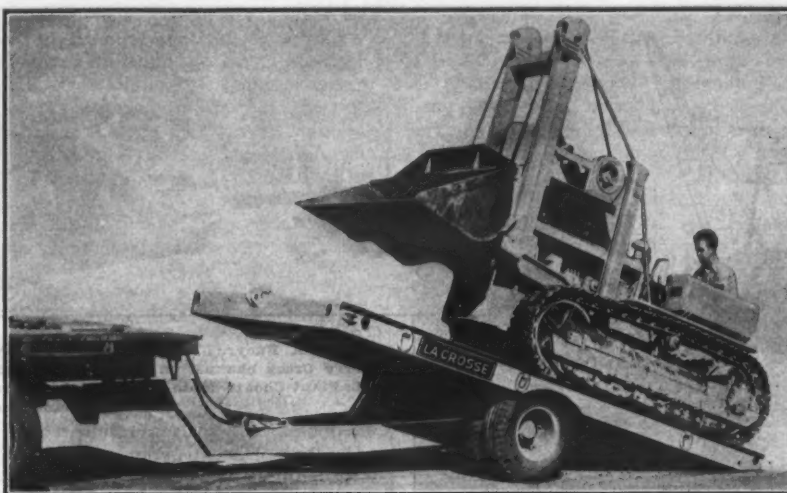
Tilt-Bed Trailers Made in Two Sizes

Tilt-bed trailers in two sizes are made by the La Crosse Trailer Corp., Funk Bldg., La Crosse, Wis. They are designed to speed job-to-job hauling of tractors, mixers, compressors, and other equipment. The Model TSA-2 has a capacity of 8 to 10 tons; the Model LTA-4, 6 to 8 tons. Both can be used behind any 1/2 to 1-ton truck equipped with a standard pintle hook. And, according to the manufacturer, both trailers can be loaded or unloaded by one man without the need for jacks, skids, or blocks.

The Model TSA-2 has a 96 x 187-inch platform. It is equipped with a single axle and dual wheels measuring either 9:00 or 10:00 x 15. Double-acting hydraulic cylinders cushion the trailer platform when it is being tilted, either with or without a load. The one-piece axle and drawbar are removable so that the trailer can be used for hauling long structural members, poles, etc. The trailer is available with heavy-duty La Crosse air or vacuum brakes, safety chains, and 6 lashing rings. It has a weight of approximately 4,200 pounds.

The Model LTA-4 has a 78 1/4 x 124 1/2-inch platform, and has a tandem axle equipped with four 7:00 x 20 tires. The entire trailer is tilted by removing the pin from the hinged drawbar so that the weight of the load brings the trailer down into position; afterwards the pin is re-inserted. The LTA-4 is equipped with Warner electric brakes, safety chains, and 4 lashing rings. It has a weight of 3,950 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 76.



The LaCrosse TSA-2 tilt-bed trailer has an 8 to 10-ton capacity, and a 96 x 187-inch platform. It is equipped with a single axle and dual wheels.

Large Sheepfoot Rollers Available in Two Models

Two heavy-duty tamping rollers are described in catalogs released by the Shovel Supply Co., 4900 Hines Blvd., Dallas 1, Texas. One is the Ferguson No. 112 roller, which has a loaded weight of 10,200 pounds and is said to exert a pressure of 242 pounds per square inch of foot area. The other is the Gebhard Model No. 22 roller, which has a loaded weight of 33,585 pounds and a bearing pressure of 685 pounds per square inch of foot area.

Both folders contain a complete list of specifications covering drum dimensions, number of feet per roll and their size, tamping area of each foot and number of feet on the ground at any one time, bearing pressures when the rollers

are loaded or empty, and diameter of the drum shafts.

The bulletin on the Ferguson roller describes construction features such as the tongue and front-pull member, frame, cleaning action, feet, and shaft and bearings. For the Gebhard roller the features so described are the shaft and shaft housing, bearings, hinges and pins, hitch, and frame construction.

Copies of this literature may be obtained from the company. For the Ferguson 112 catalog, circle No. 116;

for the Gebhard Model 22 catalog, circle No. 117.

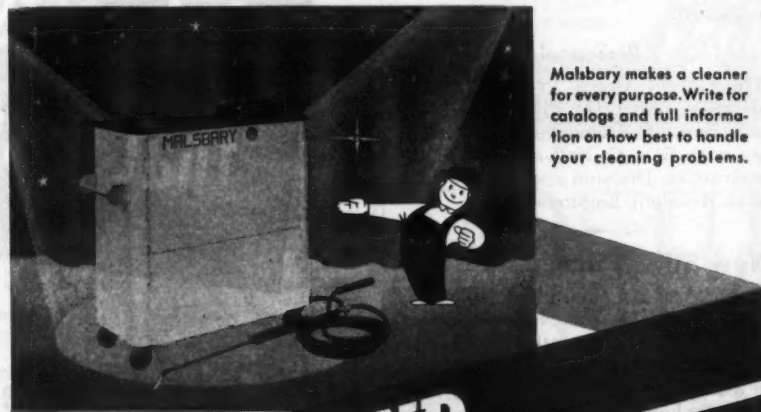
Diesel-Tractor Catalogs

Two diesel-tractor catalogs have been put out by the Caterpillar Tractor Co., Peoria 8, Ill. Catalog No. 11628 covers the 32-hp track-type Model D2, while Catalog No. 11796 covers the use of Caterpillar tractors on a variety of jobs.

Catalog 11796 shows diesel tractors equipped with root rake for clearing and piling, and with bulldozer, winch, and stumper for landclearing operations. It shows them clearing ahead of construction, opening up quarries, clearing for creek channels, and clearing for irrigation and farmland.

Catalog 11628 contains 32 pages of information on the design, construction, and operational characteristics of the D2 tractor. It features a "cut-open" side view of the tractor which is tied in with short descriptive text about the tractor's principal parts. The catalog discusses the uses for which this tractor is suited, the heavy-duty power unit, the fuel system, the governor, and the lubrication system. It also describes the features of the crawler track, and the Caterpillar accessories available for use with the D2. One page of the catalog gives a complete list of specifications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 40.



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CONTRACTORS AND ENGINEERS MONTHLY

Good Machines Needed For Good County Work

Counties Do Most Effective Road Maintenance and Construction With Plentiful, First-Class Equipment

By S. R. LAUGHLIN, Road Supervisor, Kosciusko County, Indiana

THE equipment needed today for the big job of building and maintaining county highway systems raises an important question for county highway departments—whether to do the work through private contract or to purchase equipment and do the work through their own highway organizations. Several factors must influence the decision: the number of miles of road to be maintained, the character of the roads, the availability of materials and efficient labor, and the prospect of proper supervision and administration.

For example, some counties in a state might be handicapped in doing their own work by lack of good material, which would make necessary the purchase of commercial and processed material and costly shipments. Good truck drivers, mechanics, and equipment operators are not always easy to get; although this factor is largely a question of supervision, and the ability to build up, direct, and hold together an organization.

As County Highway Supervisor of Kosciusko County, Ind., the writer—backed up by the County Board—decided a few years ago that the County would buy its own equipment, build its own roads, and maintain them. That has been its policy for some time and is in effect today.

Personnel, Equipment

The County employs 30 to 35 men. All of them are permanent help, and more than one-half of them have been with the Highway Department from 9 to 12 years. The County has found that trained engineers, though they are good and have their place, are not necessary on county highways; practical experience can do the job.

At present, the County owns more than 60 pieces of maintenance and construction equipment—much of it new, and nearly all of it good. This equipment consists of trucks, tractors, graders, maintainers, drags, mowers, loading cranes, a distributor, a traveling mixing plant, and a processing plant with a stone crusher.

During the war years, when no new equipment could be obtained, the County kept its old equipment in repair until such time as new equipment could be purchased. (All repair of equipment is done in the County's own shop. There too, during the winter and slack season, all equipment is reconditioned and painted if necessary.) Then during 1946 and 1947 it purchased several new trucks, tractors, and mowers.

Prior to 1946 the County made its bituminous in-place mixtures using a distributor and power grader. But this method, it found, was rather crude and used an excessive amount of bitumen to provide the mixture desired. So early in 1946 it bought a traveling mixing plant.

This plant is operated at the point of construction. The aggregate is trucked in and dumped on the road. A power grader forms it into a windrow. It is then picked up by the traveling plant, mixed in the machine to county specifications, dropped in the center of the road, spread by the motor grader, and then rolled for an even surface. A uniform mixture results from feeding the aggregate and bitumen directly into the machine. There is no waste of material, and the mixture can be made with a much higher per cent of moisture than by the grader method. The County also

uses this mixture for patching, and has found it very good. The plant will turn out about 400 cubic yards in 10 hours, giving county forces a construction rate of about 0.8 mile of new road a day.

The County also added to its equipment last season a new bituminous paver. The machine is expected to be a valuable acquisition, as it distributes the mixture at the point of construction and gives a mat of uniform width and thickness. It also does away with the use of the motor grader. The method of operation with this new machine is to set up the mixing plant at the pit, or material base, and truck the mixture to the point of construction, where the paver makes the distribution.

Pit-run gravel in Kosciusko County contains large aggregate which has to be removed in order to provide usable material. In order to overcome this difficulty, the County purchased a processing plant with a stone crusher, through which all pit-run gravel is processed. The plant is fed by a crane

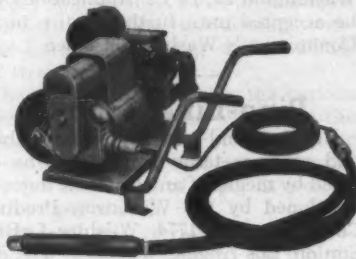
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6-Mile Paving Job on N.Y. Route 17



Here come the dirt movers. Grading team, made up of four scrapers and two dozers, starts on the day's work.



New York State Highway Department engineers go into a huddle. Left to right: Thomas J. Cornell, bridge engineer; John C. Crawford, detail engineer; and R. P. Berleau, engineer in charge.



Bethlehem Reinforcing Bars shown in place in culvert. Project used 25 tons of reinforcing steel.



Easy does it! Workmen carefully gauge distance to road form before placing Bethlehem Bar Mat.



Batch-bucket shuttles back and forth endlessly, as it drops new concrete over Bethlehem Bar Mats.

In order to make Route 17 straighter and safer, the New York State Highway Department authorized six miles of new construction between Jasper and Addison. The new highway is two lanes wide, and is relatively free of turns and grades. It was constructed by Potter DeWitt Corp., of Pavilion, N. Y. Steel items supplied by Bethlehem were bar mats, reinforcing bars and cable guard rail.

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Good Machines Needed For Good County Work

(Continued from preceding page)

operating alongside of it in the pit, and it turns out from 40 to 50 cubic yards an hour or 400 to 500 cubic yards daily. The County estimates that the plant saves the work of two men who would be needed to remove the stone if the mixture were made without the processing operation. And the material it turns out is excellent for use on gravel roads and in general repair.

1947 Costs, Accomplishments

County mileage in Kosciusko County was 1,285.5 miles at the beginning of 1947. The revenue the County received was \$178,138.25 from regular distributions and an additional \$20,159.09 under a 1947 statute. This made a total of \$198,297.34 or \$154.25 a mile for the year of 1947.

In addition to maintaining the mileage indicated, the County also applied over 600,000 gallons of bitumen. Of this amount, 130,000 gallons was asphalt which was used in applying seal coat and patching; and 470,000 gallons was road oil which was used in building new black-top. During the 1947 season, 38 miles of new black-top were built to a width of 18 feet and a depth of 3 inches after rolling.

Costs on these jobs ran reasonably uniform, varying somewhat with the cost of material transportation. The average for the 38 miles was slightly under \$1,400 a mile. The following figures are taken from the costs compiled on one mile of road built during 1947:

12,350 gallons of road oil at 6.53 cents per gallon	\$ 806.46
600 cubic yards of processed gravel at 60 cents per yard	360.00
Labor, including use of equipment	228.00
Total	\$1,394.46

This figure exceeds the County's 1946 cost by approximately \$220 a mile. A similar increase was noted for 1948.

During 1947, the County also built 7.3 miles of new road, which were cleared, graded, drained, and graveled ready for traffic. This item, together with the mileage which was turned back to the County by the State Highway Commission, increased its mileage in the amount of 10 miles. For work of this character, the County has 2 RD7 Caterpillar tractors, a bulldozer, and 2 hauling scrapers of 7-yard capacity each.

From its experience in building and maintaining Kosciusko County roads, the County Highway Department is thoroughly convinced that it could not have accomplished these results without having on hand plenty of first-class equipment.

From a paper presented at 34th Annual Purdue Road School.

Highway Engineers Needed

A call for highway engineers and highway-bridge engineers, to fill positions in the Public Roads Administration and in other Federal agencies in Washington, D. C., and throughout the United States, has been issued by the United States Civil Service Commission. A few positions outside the United States may also be filled. Salaries range from \$3,727 to \$5,232 a year.

To qualify, applicants must (1) have completed a standard professional engineering curriculum leading to a bachelor's degree, or (2) have had 4 years of technical engineering experience, or (3) offer any combination of (1) and (2). In addition, from 1 to 3 years of professional engineering experience is required, part of which must have been in highway or highway-bridge engineering. Appropriate graduate study may be substituted for as much as 2 years of experience. No written test is required.

Further information and application

forms may be secured from most first and second-class post offices, from civil-service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications will be accepted until further notice in the Commission's Washington office.

Pipe-Line Locator

Underground pipes, buried cables, and other metallic objects can be located by means of an electronic detector developed by the Wilkinson Products Co., P. O. Box 1774, Wilshire-LaBrea Station, Los Angeles 36, Calif. The device is of special use to contractors

working in developed areas where these underground objects may be torn up or harmed accidentally.

The Wilkinson one-man-operated line locator consists of a transmitter and receiver connected by a wood handle, head phones, a drop handle, and direct cable. Its especially sensitive meter gives a visual indication of the pipe location, the company points out, and a gage on the receiver indicates the depth of the located object. The line locator is powered by flashlight and portable-radio-type batteries. A single control on the receiver is said to provide the operator with a flexible means for adapting the instrument to various

conditions.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 80.

Personnel Changes for SKF

Stuart H. Smith has been appointed Cincinnati District Manager by SKF Industries, Inc. He formerly held the position of Assistant District Manager of the Detroit office. Five men have been named as field representatives: C. N. Benson and D. B. Eden, Boston; A. R. Ehrnschwender, Cincinnati; J. T. Paradise, Atlanta; and G. L. Hansen, Portland, Oreg.

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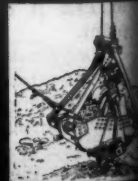
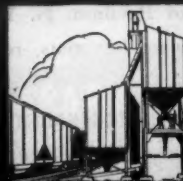
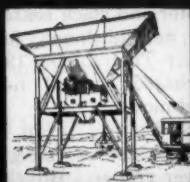
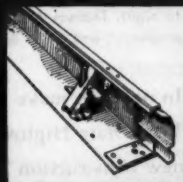
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John A. Keck Becomes Ky. Highway Commissioner

John A. Keck was officially sworn in this past January as Commissioner of the Kentucky Department of Highways. He succeeds Garrett L. Withers, now United States Senator for Kentucky.

In a statement issued following his acceptance of the post, Commissioner Keck commented, "Kentucky's road needs are many, and I recognize the problem of matching what we can do against the vast program that needs to be accomplished. . . . Our highway funds must be spent with the idea of the greatest possible benefit from every

dollar." He also commented on the importance of roads to the people of the state, and on the progress already made in Kentucky's overall road program.

Construction of Wire Rope

A picture trip through a modern wire-rope factory is the theme of a catalog issued by the Union Wire Rope Corp., 2100 Manchester Ave., Kansas City 3, Mo.

The catalog shows the laboratory for testing the quality of the wire rope and the materials which go into it; the heat-treatment room where metal rods or wires are processed to produce a uni-

form, crystalline structure of definite grain size; the cleaning and coating department; and the room where the dies are made for drawing the rope to fine degrees of accuracy. Final photographs show wire drawing, galvanizing, wet-wire drawing, spooling and welding, and stranding.

The catalog also describes the various types of wire rope, and illustrates the grouping of wires and strands in the common types. It lists recommended uses for each type of rope, as well as the features of each.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 98.

High Piers Required On New River Bridge

(Continued from page 3)

Then rising waters brought about a game of tag. The seal was poured on pier II, but the river came up rapidly after heavy rains and drove out the bridge builders in December, 1947. After a drop in the Yazoo, they returned to pier II, completed the footing, and were again chased off in January, 1948, by the swollen current. This time work on pier II was not resumed until late in May when the waters receded. In the meantime the contractor moved across the river, but as the ground level on the north shore is about 10 feet lower than on the south bank, little could be accomplished on either piers III or IV. Foundation piles had been driven for pier IV, and some bank-retaining falsework built on the shore for pier III, when high water again halted the work.

Once the Yazoo dropped down within its banks, work was resumed. A tramway trestle was constructed on the north shore extending from pier IV out to pier III at the edge of the river. The piles were driven into the firm sand, and the concrete structures were poured within the protecting cofferdams.

Concrete Operations

For unwatering the cofferdams and keeping them dry, three centrifugal pumps were used—two gasoline-driven Gorman-Rupp 6-inch pumps and one Red 4-incher. The pier forms were solidly constructed of vertical 2 x 4's faced with 1/4-inch Masonite form board, and were backed with double 2 x 8 horizontal wales on 2-foot centers. Through the wales passed 1/2-inch tie rods with Spi-Ro-Loc form clamps on 2-foot centers both ways. Vertical 2 x 4's outside the wales furnished additional support.

A concrete batch plant was set up on the south bank. It consisted of a Johnson aggregate bin beneath which was a timber platform supporting a Ransome 2-yard stationary concrete mixer. This was high enough off the ground so that the mixed concrete was discharged directly into buckets carried on trucks which pulled alongside the plant. Bag cement was stored in a shed adjoining the plant. The bags were emptied by hand into a mining car, which held up to 16 bags. This car was then pulled up a 50-foot incline to the mixer where the cement was dumped into the drum. Motive power for the inclined car was supplied by a single-drum hoist attached to and working off the concrete mixer.

Sand and gravel for the fine and coarse aggregate were supplied by Peterman Bros. of Yazoo City, Miss. Delivery was made by truck after a 40-mile haul, and the material was stockpiled near the plant. A Lorain 55 crane with a 75-foot boom and an Owen 3/4-yard clamshell bucket charged the aggregate bin. Lone Star cement used on the job was shipped by rail from the mill at Spocari, Ala., to a siding of the Yazoo & Mississippi Valley Railroad at Redwood, Miss., near the south end of the project. From there the bag cement was hauled by truck to the batch plant. Reinforcing steel was furnished by the Connors Steel Co. of Birmingham, Ala., and delivered to the job site by truck. Water for the concrete was pumped from the Yazoo River by a Simplex 2-inch pump, and delivered to the plant through a 1,000-foot-long 2-inch pipe line.

The Batch

Two different grades of concrete were used in the pier contract. The smaller amount, 1,620 cubic yards of Class S concrete, went in to the non-reinforced seal pours. The larger item, 5,875 cubic

(Continued on next page)

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High Piers Required On New River Bridge

(Continued from preceding page)

yards of Class C concrete, made up the footings and piers. The Class C concrete was mixed in the proportions of 1:2.2:3.9, and had a cement factor of 1.25. The weights of a typical 10-bag batch of C concrete were as follows:

Cement	940 lbs.
Sand	2,398 lbs.
Gravel	4,107 lbs.
Water	65 gals.

Following are typical gradations of sand and gravel sampling:

Sieve Size	Per Cent Retained	
	Gravel	Sand
1 1/2-inch	12	....
3/4-inch	65	....
3/8-inch	92	....
No. 4	97	1
No. 8	99	10
No. 16	100	25
No. 30	....	50
No. 50	....	95
No. 100	....	100

Pontoon Line

Batches were mixed for two minutes. When pier I was being built, the concrete was discharged into a special 2-yard concrete bucket made for the pier contractor by the Yaun Dragline Buckets & Mfg. Plant. A truck carried the bucket to the pier where it was emptied into the forms by the cranes through hoppers, elephant-trunk pipe, or tremie buckets for the seal pour. The concrete was brought up in 12-inch lifts and vibrated by both Master and Viber vibrators. It was cured with wet burlap.

When the other piers were being built, the concrete was discharged from the mixer into a Rex Model 190 double 7-inch Pumpcrete machine. A 7-inch pipe line ran out the tramway to pier II. From the end of the trestle the pipe was floated across the river on pontoons to pier III, and from there to pier IV it was carried on the work trestle jutting out from the north shore. The Pumpcrete had a capacity of 50 cubic yards of concrete per hour, pumping 1,000 feet horizontally with a 100-foot lift if necessary. The maximum distance pumped on this job was around 967 feet.

Navy surplus steel life rafts were used to float the Pumpcrete pipe line across the Yazoo River between piers II and III. They were strung out 20 feet apart, and held together with two 12-inch posts or piling laid 6 feet apart and fastened to the pontoons by wire. Across these posts 2 x 8's were placed on 6-foot centers to support the lengths of pipe.

As the Yazoo is a navigable stream at this point, the middle portion of the pontoon line was constructed so that it could be easily disassembled whenever a boat had to pass. Arrangements were made, however, for shipping to give 24-hour notice so that the contractor could schedule his concrete operations without having to break his line at an awkward time. When the river was high and the current was swift, the pontoon line could not be used, since it was impossible to hold it in place. It was then disconnected and swung out in the river downstream from pier II, parallel to the bank.

Quantities and Personnel

Gordon Walker personally supervised the work on his contract. The major items involved in the construction of the four piers included the following:

Excavation	11,500 cu. yds.
Concrete, Class C, piers, footings	5,875 cu. yds.
Concrete, Class S, seal	1,620 cu. yds.
Reinforcing steel	205,000 lbs.
Untreated-timber piling	46,000 lin. ft.

Approach-Spans Contract

Foster & Creighton's contract for the approach spans included the construction of 24 reinforced-concrete bents, with the numbering starting at the south end of the project. Seven bents are on the south side of the bridge, and the remaining seventeen are on the north shore. The contract also included

the steel superstructure carried on the bents, and a 7 1/2-inch concrete deck slab. This approach-span contract, with steel superstructure and concrete deck slab, extends right up to the piers carrying the trusses. The design loading is H20-44, and the roadway is 26 feet wide with an 18-inch curb on each side. The railing consists of a two-rail cast-in-place concrete barrier.

The two end bents, numbers 1 and 24, are stub abutments, each supported on eleven 12-inch 53-pound steel H-beam piles, 75 feet long. On the south side these piles were driven through a fill 35 feet high. For excavating, pile driving, concrete handling, and steel erection, three cranes were available on the job. One was a Koehring with a 65-foot boom, and the other two were Lorains—one with an 80-foot boom, and the second with a 70-foot boom and a 20-foot jib. The steel piles under the abutments were driven to 35-ton bearing by a 4,000-pound drop hammer. Six of these piles are vertical to carry the

(Continued on next page)



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Send for these booklets

Two booklets: "The New PlyForm" and "Concrete Forms of Douglas Fir Plywood" are now available. They will help you gain the full advantages offered by Douglas fir plywood concrete form panels. Write the Douglas Fir Plywood Association office nearest you: Tacoma Building, Tacoma 2, Washington; Shoreham Building, Washington 5, D. C.; Daily News Building, Chicago 6; The 500 Fifth Avenue Building, New York City 18.

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OFFERS OUTSTANDING ADVANTAGES . . . PlyForm's superior ply construction, plus the highly moisture-resistant glues* which bond the plys, make it ideal for multiple re-use form work. The large panel sizes go up quickly, are light and easy to handle, hold nails firmly, are easy to work with hand or power tools. PlyForm is strong, rigid, puncture-proof, water and mortar tight. The smooth, solid panel faces produce concrete surfaces that are free from joints and fins, smooth and easy to finish. PlyForm panels are sanded both sides, edge-sealed with a distinctive green sealer, and mill-oiled unless otherwise specified.

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LARGE, LIGHT, STRONG

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Panels**



load, while the remaining five are battered 3 in 12 to take the earth thrust of the fill. The batter also prevents any stress from being exerted on the adjoining spans in case there should be any subsidence at the abutment sites.

The concrete bents are supported on creosoted-timber foundation piles spaced 2½ feet on centers both ways, on the average. They are from 40 to 70 feet long with 7 to 12-inch tips and 12 to 18-inch butts. They were driven to 20-ton bearing by a 4,000-pound drop hammer in swinging leads.

Concrete Bents

As the bents varied in height, so too did the footings differ and the number of foundation piles required at each bent. Thus a twin 8 x 8-foot footing at some of the smaller bents needed only 9 piles for each footing, while the larger, solid footings measuring 33 x 15½ feet required 78 bearing piles. The larger bents are No. 7 adjoining pier I on the south shore, and Nos. 8 and 9 following after pier IV on the north side of the project.

The footings average between 4 and 5 feet thick, while, in addition, a 3-foot seal was poured at bent 7. Cofferdams of wood sheeting were driven at most of the bents. But at 7, 8, and 9, coffered steel sheet piling—M-117 sections, 35 and 25 feet long—were driven. They were later pulled out by a Vulcan 800-A pile extractor.

All except the short bents have tie beams connecting the twin shafts or columns, which vary in height from 27 to 90 feet measured from bottom of footing to top of cap. The tie beams are near the bottom of the bents, but bents 7 and 8 also have two intermediate tie beams measuring either 2 x 3½ feet or 2 x 2½ feet in cross section. The columns vary from 3 to 4 feet square. They are topped by concrete caps 26 feet 6 inches long, and either 3 x 3 feet or 4 x 4 feet in area.

Forms and Concreting

Forms for the bents were built of 1-inch sheeting lined with ½-inch plywood and backed with horizontal 2 x 6's on 12-inch centers. These 2 x 6's were interlaced at the corners of the column forms where extra strength was furnished by either 4 x 4 or 6 x 6 vertical struts. The latter were secured with Richmond ½-inch tie rods, which did not, however, pass through the concrete. Much of the lumber for the form

work was cut with a Durex No. 5 tilting table saw with a 12-inch blade.

For the pours on the south side of the project, arrangements were made to obtain concrete for the bents from the batch plant of the pier contractor. The concrete was delivered to the bent being constructed in a 2-yard bucket set on a truck. It was then discharged through a side-door opening near the bottom into a ½-yard bucket set on the ground. The latter was lifted to the forms by one of the cranes.

The north-shore bents were also poured by crane and bucket. The concrete was mixed in Jaeger ½-yard mixers, of which there were two on the job. A Winslow aggregate bin handled the sand and gravel. Materials for the concrete were obtained from the sources mentioned previously under the pier contract. Water for the concrete was pumped from the river to a tank set up on a high tower bent near the bridge. It flowed by gravity from there to where it was needed.

Articulated Steel Stringers

Structural steel for the superstructure over the bents was furnished by Bethlehem Steel Co. and shipped by rail from its fabricating plant at Pottstown,

Pa., to a siding of the Yazoo & Mississippi Valley Railroad at Floweree, Miss., just north of the project. Trucks hauled it the short distance remaining to the job site, where cranes did the erecting. In general the superstructure consisted of four 36-inch 160-pound I-beams as stringers, laid out 7 feet 8 inches apart.

The connections in these steel stringers were articulated, and set back 5 feet 7 inches from the center line of the bent. The joint was made with two link bars, one on each side of the web, and connected by two 3-inch pins secured with standard Lomas nuts. The link bars measure 6 inches x 1 inch x 2 feet 2½ inches long.

This articulation design permits freer movement for contraction and expansion in the steel members. It also confines any possible damage in the bridge to the individual spans, and makes the structure less vulnerable if, for example, a span should go out during a flood.

Panel forms for the deck slab were hung from the steel members.

Concrete Deck

When the 7½-inch concrete deck was being poured, a Rex No. 160 single



"What's the hurry?"

Pumpcrete machine was used to pump the concrete from the mixer through a 6-inch pipe line. The north side of the bridge was worked on first, with the pipe line extended out from shore over the finished work. Wooden horses carried the pipe line. As the concrete was placed, the material was leveled off with

(Concluded on next page)

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Tops in Performance - Bottoms in Costs

ON THE TRENCHING JOBS

Through a wide range of transmission-controlled speed combinations, ample power for the toughest digging, strength and endurance to keep going over the roughest terrain and through the meanest soils, and extreme ease of handling in the tightest places, CLEVELANDS have set unsurpassed records on all types of jobs. Their rugged unit-type construction from the finer, tougher steels, fine engineering and low fuel consumption cut maintenance and operating cost to a minimum. Whatever your next trenching project—whether it's for gas, water, sewer, oil, cable, conduit, drainage or building foundations—you'll find CLEVELANDS the ideal investment.

THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVENUE CLEVELAND 17 OHIO

TRADE MARK

High Piers Required On New River Bridge

(Continued from preceding page)

a steel screed. Later the equipment was shifted to the south shore to pour the seven spans on that side.

The Class B concrete used in the construction of the bents and slabs had a cement factor of 1.5, and was mixed in the proportions of 1:1.73:3.22. The weights of a typical three-bag batch were as follows:

Cement	282	lbs.
Sand	567	lbs.
Gravel	1,014	lbs.
Water	16½	gals.

Wet burlap was used to cure the sides of the bents, while wet sand was kept on the slabs for the same purpose.

Quantities and Personnel

The major items in the contract for the approach bents included the following:

Excavation	4,000 cu. yds.
Concrete, Class B	5,157 cu. yds.
Structural-steel beams	1,335,300 lbs.
Reinforcing steel	442,200 lbs.
Concrete railing	3,120 lin. ft.
Treated-timber piling	24,000 lin. ft.
Steel piling, end bents	1,550 lin. ft.

Foster & Creighton Co. was represented on the contract by Ralph E. Gaines, Superintendent.

For the Mississippi State Highway Department, George Lemon was Project Engineer. The Department is headed by R. A. Harris, Chief Engineer, with S. A. Tomlinson, Construction Engineer; C. S. Hill, Bridge Engineer; and E. W. Marley, District Engineer.

Shovel's Feature Is All-Electric Control

A power shovel with all-electric controls is announced by the Marion Power Shovel Co., Marion, Ohio. Control of the various speeds and direction of rotation is obtained by the use of a Ward-Leonard system of generator-voltage control. The 111-M Ward-Leonard machine is equipped with a 3½-cubic-yard dipper and 33-foot boom; a 6-cubic-yard dipper is available for special use.

The motor-generator set of the 111-M Ward-Leonard consists of an exciter and an induction motor direct-connected to three dc generators, all mounted on a self-supporting sub-base. Each generator is of the Ward-Leonard type and is designed for variable voltage control. One supplies power for the hoist motor; one for the swing and propelling motor; and one for the crowd motor.

The manufacturer explains that these shunt-wound 220-volt dc mill-type motors have low armature inertia and high overload capacity, and are designed for extreme reversing service. The hoist motor is equipped with roller bearings and is force-ventilated. The swing-and-propel motor is of the vertical type and is equipped with ball bearings. The crowd motor is of the horizontal type and is bolted to a base which forms an integral part of the shovel boom.

Other features claimed for the machine include simplified design, heat-treated machine-cut gears, all-welded construction, stiffleg gantry, all-welded box-section boom, and conveniently arranged operating controls.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 109.

Portable Batching Plant

Features of the Type M portable cement plant are listed in a 4-page folder issued by the Erie Steel Construction Co., 287 Geist Road, Erie, Pa. The Type M plant is made in three sizes with capacities of 29, 45, and 73 cubic yards. It is designed for use in batching bulk cement into batch trucks or truck-mixers.

Form M-2 lists and diagrams the ca-

pacities and dimensions of all three sizes. Large photographs show the Type M plant in use on several different jobs. The bulletin discusses the features of the vertical bucket elevator, the Cementer and scales, and the plant assembly. It also mentions the larger Model L Erie plants.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 25.

Hoists and Dump Bodies

Dump bodies and hydraulic hoists are described in two catalogs issued by the St. Paul Hydraulic Hoist Division of Gar Wood Industries, Inc., 2207 University Ave., S. E., Minneapolis 14,

Minn. The St. Paul hoists are made in double-arm and direct-lift types, both of which are covered in detail in Catalog 37-168. The other catalog, No. 37-70, describes the Model BR dump bodies which are designed especially for use by contractors.

The catalog on the Model BR presents a large sketch of the body showing its overall appearance. Detailed sectional drawings keyed to this illustration show the various construction features of the St. Paul body. The catalog also pictures the construction of the body sub-frame, and the various positions in which the tail-gate can be set.

Catalog 37-168 describes six St. Paul hydraulic hoists. These are the Models 46, 47-7, 47, and 53 double-arm types;

and the Models 36 and 36-7 direct-lift types. The catalog gives information on the size of cylinder, length of stroke, and the length of bodies with which each can be used. It also describes the low-mounting styles which are available for each of these hoists.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 111.

Merrill Appoints Franks

Howard L. Franks has been named Director of Sales for Merrill Bros. of Maspeth, N. Y. Merrill manufactures a line of drum-handling and opening tools, lifting clamps for metal plates, and other special tools.



Changing the channel of the Yakima River, near Ellensburg, Wash., this "Caterpillar" Diesel D7, with No. 75 Bulldozer, works in 3 feet of water, doing a difficult job with ease.



On a highway job near Hampshire, Tenn., this "Caterpillar" Diesel D8 Tractor with No. 85 Bulldozer operated at 1½¢ per yard lower maintenance cost than a competitive tractor.



A "Caterpillar" Diesel D7 and No. 75 Bulldozer clearing rocky land for a citrus grove, Santa Paula, Calif. Operator says: "This is the neatest operating 'dozer I've ever worked with."



A "Caterpillar" Diesel D6 Tractor with No. 6A angling-type Bulldozer, is shown here building dike for a big new irrigation system in the Rio Grande Valley near Eagle Pass, Texas.

Top-Dog in the

Three years ago the "Caterpillar" Bulldozer entered the earthmoving picture. Since then thousands of contractors have used it on their jobs—proved its toughness—checked its big yardage and low operating costs. From coast to coast they talk about its ease of adjustment, its freedom from overhead structures, and the excellent rolling action that's built into the blade. Today, more than ever, this rugged unit is hailed everywhere as Boss of the Bulldozers.

Designed and engineered as perfect teammates for the power of "Caterpillar" Diesel Tractors, "Caterpillar" Bulldozers are now available in a complete line of both cable-controlled and hydraulic-controlled units. See your "Caterpillar" dealer for full particulars. He can also supply you with information on how these revolutionary 'dozers can be used with tractors of other makes.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

Folder on Wall Forms

Forms for wall construction are the subject of a 4-page folder issued by the Symons Clamp & Mfg. Co., 4251 Diversey Ave., Chicago 39, Ill. The Symons system of wall-form construction uses the regular panels, but with a special type of hook-up. In the Symons system, the tie rods do not go through the panels, but are anchored at the sides. In this way they act as spreaders, explains the manufacturer, and do away with much of the regular bracing.

The folder explains the functions of each of the three pieces of hardware used in the Symons system—the connecting bolt, wedge, and form tie. It shows a typical wall-form set-up and

illustrates the use of wales, the wale plate, and the wale tie. It also pictures and describes the Symons breakback washer spreader ties.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 44.

Equipment for Builders

A stiff-bound catalog which lists a line of equipment for use by builders is available from Acrow, Inc., Sales Division, 420 Lexington Ave., New York 17, N. Y. Equipment listed in Catalog No. 11 includes steel shores, column clamps, steel forms, trench jacks, scaffolding stands, scaffolding and cradling, hoists, pumps, portable saw rigs,

bar benders, jacks, forms for pre-cast concrete shapes, and mobile shelves and storage cabinets.

These items are made in a wide range of styles and sizes for a variety of construction work. The catalog describes each of them in detail and lists special features claimed for each. Thumb tabs divide the catalog into sections according to the various types of equipment, and a general index at the back helps in locating any particular item. The company has also made available—in separate catalogs—the various sections of descriptive material contained in the large edition.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 104.

Four Cutting Edges On New-Style Teeth

Replaceable bucket teeth for use with trenching machines, shovels, and other equipment are available from J. L. Kelley of Findlay, Ohio. The Gee-Kay teeth are reversible and have a cutting edge on both ends. This gives a total of four cutting edges for each tooth, the manufacturer points out; and as one side of the cutting edge is being dulled by use, the abrasive and wearing action is causing the other side to be sharpened.

The Gee-Kay teeth are held in place by an adapter which is made in styles to fit all standard buckets. The tooth is held to the adapter base by a special heavy bolt. This bolt is loosened to reverse the tooth. On buckets such as those used with trenchers, it is also necessary to remove the cotter pin and clamp in order to switch the tooth.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 69.

Beam-Load Slide Rule

A rapid-calculating pocket-size slide rule for determining beam and column loads has been developed by the Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill. Purpose of the slide rule is to provide a quick and accurate means of estimating the amount of weight which can be supported by various Unistrut sections under varying conditions of span and unbraced height. Conversely, it can also be used to indicate the various combinations of Unistrut sections required to support a given load.

Unistrut manufactures a line of all-purpose steel members for use in framing operations. These are made in five basic types, the dimensions and cross sections of which are listed on the calculator. For each length of span the calculator indicates the uniform loads which each member will support and the maximum deflection which will occur. Also listed is the resistance to slip and the pull-out strength of the Unistrut nuts.

This slide rule is available by writing to the company. Or use the enclosed Request Card. Circle No. 99.

Airport Lighting Guide

A 50-page booklet on airport lighting has been put out by the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. It presents detailed lighting plans and wiring diagrams for large airports, and is designed to serve as an aid in planning a new field or improving an old one.

The booklet covers all types of Westinghouse lighting and distribution equipment. The equipment is keyed by symbols to the lighting and wiring diagrams. A runway-equipment chart is included to facilitate selection of the equipment. The booklet also contains a section on other Westinghouse airport equipment—wind instruments, starters, etc. A special section discusses the all-weather approach-lighting system which is said to be visible through 1,000 feet of the thickest fog.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 106.

Scholarship Fund Set Up

A scholarship fund to provide assistance for students in civil and mechanical engineering has been set up at the Illinois Institute of Technology located in Chicago, Ill. Known as the Stephens-Adamson Foundation fund, it was established by D. L. Stephens, President of the Foundation and of the Stephens-Adamson Mfg. Co. of Aurora, Ill. Other Foundation officers are R. W. Bauer, Vice President, and R. S. Wells, Secretary-Treasurer.



This "Caterpillar" Diesel D8 Tractor with No. 85 Bulldozer handles 6000 to 8000 tons of sand and gravel daily at the Henry J. Kaiser plant, Pleasanton, Calif. Supt. B. F. Carter says: "Caterpillar" equipment stands up better and does a better job. Wouldn't have anything else."

Dozer field

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL
ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

Slopes Stabilized As Job Progresses

Slopes on Wilbur Cross Highway in Connecticut Are Stabilized During Construction, Not After

✦ EARLY in 1946 and 1947, grading contracts totaling approximately 16 miles were awarded to five contractors on the last link of the Wilbur Cross Highway between East Hartford and Willington, Conn. Traversing rugged topography on entirely new right-of-way, and designed for easy grades, the projects entailed heavy cuts and fills throughout their entire lengths. Naturally, these cuts and fills would be subject to excessive erosion.

For several preceding years, forces of the Bureau of Roadside Development had gone in on various projects during the course of construction to stabilize individual, high cut slopes which, if left unprotected, would have eroded badly. In all cases this practice had worked out to the mutual satisfaction of the contractors and the Connecticut State Highway Department. Therefore, the Bureau considered that the Wilbur Cross Highway projects offered an excellent means of demonstrating on a large scale the practicability of this procedure, and it was decided to go through with this plan if possible.

Contractors Cooperate

The first step essential to the success of this undertaking was to secure the consent and whole-hearted cooperation of the grading contractors. All five of them, mindful of the success obtained on the previous projects, consented to the Bureau's coming in on their contracts, and agreed to finish-grade the slopes and raw roadsides as the jobs progressed. In return, the Highway Department agreed to accept immediately and to take over for maintenance all the areas which the Bureau stabilized.

Forces Organized

The next step was to organize the Bureau forces so they could move in and stabilize the areas promptly and



Conn. State Highway Dept. Photos

efficiently as soon as they were completed by the contractors. This was accomplished by assigning to each project a foreman and a crew ranging from 10 to 20 men, as required, and furnishing the necessary trucks, other equipment, and tools.

In addition to overseeing the work of his crew, it was the responsibility of

Under Connecticut's method of slope stabilization prior to the completion of highway contracts, a good turf cover is established promptly to protect slopes from erosion. These slopes on a section of the Wilbur Cross Highway were seeded while grading was in progress, and, as may be seen here, were well stabilized by the time paving was under way.

each foreman to keep in close and constant touch with the contractor and the construction inspectors of the State Highway Department, in order to avoid the possibility of any delaying inter-

ference with the construction activities; and, at the same time, to be on hand to take full advantage of any cooperation the contractor might offer.

(Concluded on next page)



THAT'S HOW YOU CAN MAKE MORE PROFIT!

Many dragline operators who have "switched" to Hendrix Dragline Buckets are reporting bigger profits on each job. Some are quite frankly amazed when job reports are turned in to find that with a Hendrix there has been no delay due to break-downs . . . no maintenance cost for the bucket!

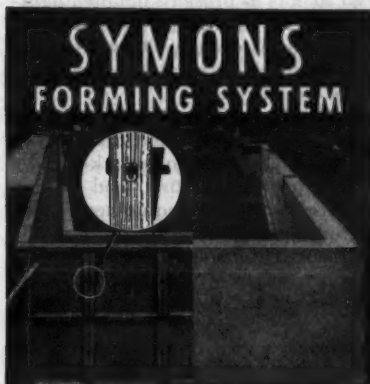
The HENDRIX, although lighter in weight than similar buckets, possesses sufficient stamina, ruggedness and wear-resisting qualities to give long-lasting service to the dragline operator. Cast manganese steel runners and wearing shoes on the TS and renewable manganese steel shoes for runners and wearing plates on the HS result in increased production through less loss of time while on the job.

HENDRIX
Lightweight
**DRAGLINE
BUCKETS**

For descriptive literature ask your dealer
or write to

HENDRIX MANUFACTURING CO., INC.

MANSFIELD - LOUISIANA



SAVES TIME

Inset shows how Symons System saves time in erecting and stripping forms. Bolt passes through 2 x 4 studs and tie loop. Wedge secures the assembly. This simple device cuts forming time 50%.

SAVES LABOR

Harry G. Dehring, Foreman, Taylor Brothers, South Bend, Ind., states "Seven men set up the forms for a 26' x 27' foundation in one hour and fifteen minutes."

SAVES COST

With Time and Labor cut in two . . . Plus savings in nails, spreaders, walers and bracing . . . Plus far greater reuse of forms . . . Costs drop to a new low.

RENTED WITH PURCHASE OPTION
WRITE TODAY FOR FREE CATALOG

SYMONS CLAMP & MFG. CO.

4251 DIVERSEY AVE.

CHICAGO 39, ILLINOIS



Job Starts

The work started very smoothly and continued throughout the duration of the jobs with a minimum of delay and difficulties—a fact attributable in large degree to the splendid cooperation of the contractors.

All seeding and fertilizing was accomplished by mixing the seed and fertilizer with water, spraying the mixture directly on the raw areas without the benefit of topsoil, and immediately covering with about 2 inches of loose hay mulch, most of which was obtained from mowing the roadsides on established highways in the general vicinity. For the most part, no attempt was made to tie down the mulch. In a few locations along the tops and sides of high cuts, when the heavy wind rolled back the loose cover, birch saplings obtained from adjacent woods were staked down at intervals over the face of the slopes. These prevented further rolling up of the mulch.

When the final cut on the last project was in progress, all roadsides up to that point had been stabilized, and most of these areas were already well established in excellent turf and satisfactorily proofed against erosion.

As soon as the paving contracts were completed, this section of the Wilbur Cross Highway was opened to traffic. Except for seeding on about 3 miles of median strip, a small amount of additional miscellaneous seeding, and the completion of plantings which were already well advanced, the roadsides on this highway were fully developed.

Method Has Advantages

Performing slope stabilization during the course of construction has several advantages. Costly erosion is prevented immediately. This benefits the contractor by relieving him of the necessity and attendant expense of reshaping eroded slopes after each storm—a factor which should reflect favorably for highway departments in the bidding on future contracts. The method eliminates the hazards and slowing down of work which are experienced when slope stabilization is undertaken after the highway is opened to traffic. And it produces a favorable psychological effect on motorists, who find themselves traveling over a completely developed highway instead of one which still bears the unsightly scars of construction.

Although the work on these projects in Connecticut was performed by forces of the State Highway Department, there is no reason why the same method cannot be carried out almost as readily by contract, in states where trained highway forces are not available.

The grading contractors on the project described were: M. A. Gammino Construction Co., N. D. Maselli Corp., D. V. Frione & Co., White Oak Excavation Co., and S. & M. Construction Co.

Insure your own personal security and that of the nation by the regular investment in U. S. Savings Bonds. Own a share in America!

"BERG" CONCRETE SURFACER Model R2-A5



A light-weight, portable, electric motor-driven Concrete Surfacers consisting of the Model R-2 Right Angle Head and Model A5 Motor Unit. Ideal for surfacing concrete construction and other applications. Quickly converted into the Model V2-A5 Concrete Vibrator for internal vibration by substituting the Model V2 Vibrator Unit for the above Head.

The Concrete Surfacing Machinery Co.
4685-4689 Spring Grove Avenue, Cincinnati 32, Ohio



Conn. State Highway Dept. Photo

This is the machine developed by the Connecticut Bureau of Roadside Development for seeding roadside areas and slopes.

ARBA Issues New Bulletin

A technical bulletin dealing with three major problems has been issued

by the American Road Builders' Association. It discusses seal-coating of asphalt pavement, chemical eradication of weeds in highway right-of-ways, and

street-car track removal and repavement for trolley or motor-bus operation. The report was prepared by the Committee on Streets and Street-Railway Pavement, Construction, and Maintenance.

Each of the three reports was written by an expert in the field, and covers actual job procedures. Illustrations and diagrams supplement the discussions. The bulletin also contains an introduction by H. H. Kranz, Chairman of the Committee.

Copies of Technical Bulletin No. 153, 1948, can be secured by writing to the ARBA at 1319 F St., N. W., Washington 4, D. C.

Mack Trucks Promotions

Mack Trucks, Inc., announces the appointment of six district managers: J. E. Donovan, San Francisco; J. W. Biggins, Louisville, Ky.; H. J. Fikejs, Kansas City, Mo.; T. J. Colter, Milwaukee; A. P. Cowles, Springfield, Mass.; and R. J. McGivney, Worcester, Mass.

This elevator just grew ten feet!

It's no trick for an AMERICAN Portable Material Elevator. When these workmen needed additional height, they used a gin pole to raise a ten-foot section and bolted it in place. And it's just as simple to add even more sections . . . up to 90 feet of platform lift.

That's just part of the story. Hauled on a truck to the job site, the AMERICAN Material Elevator is assembled in two to three hours. The 47-foot tower is pin-connected to the main frame and raised quickly and safely by its own hoist. Then you're ready to lift brick, cement and other building materials in 2500-pound loads at a smooth 90 feet a minute.

Can an ordinary wooden tower match this easy, cost-cutting assembly and fast operation? Consider the cost of labor and timbers . . . the never-ending job of keeping it in safe condition . . . the amount of lumber that's bound to be wasted. And don't forget that repeating this process on every job costs you that much more.

You can usually rent a Material Elevator from your AMERICAN Hoist distributor. Then, after you see what it can do on the job, it's a safe bet you'll want to own your own.

American Hoist and DERRICK COMPANY

St. Paul 1, Minnesota

Plant No. 2: So. Kearny, N. J.

Sales Offices: NEW YORK • CHICAGO • PITTSBURGH



American Hoist
and DERRICK CO.
St. Paul 1, Minnesota

Please send me a copy of the new
AMERICAN Material Elevator Catalog.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Utility Yard Crane Has 4-Ton Capacity

A new light-duty tractor-mounted crane is announced by Clyde Iron Works, Inc., Duluth 1, Minn. The Clyde Handi-Crane is mounted on a Minneapolis-Moline Model UTI tractor and has a capacity of 4 tons. The boom is raised and lowered by a hydraulic cylinder and will swing through a horizontal angle of 320 degrees.

The Handi-Crane has a reach of 18 feet and a raised height of 23 feet. It has an overall length of 11 feet 3 inches; an overall height of 125 inches, including the gantry construction; a wheelbase of 79½ inches; and a shipping weight of 18,000 pounds.

The Minneapolis-Moline tractor has four forward speeds ranging from 2.3 to 12.5 mph, and one reverse of 1.8 mph. It is equipped with a 4-cylinder gasoline engine which has a maximum brake horsepower rating of 48 at 1,300 rpm. Turning radius of the tractor is 17 feet 6 inches. It has 28 x 10 solid-cushion-type front tires and 6-ply 12:00 x 28 dual pneumatic rear tires.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

Catalog Sheets Available On Construction Machinery

Catalog sheets describing the complete line of Southwest equipment have been enclosed in a looseleaf folder available from the Southwest Welding & Mfg. Co., Construction Machinery Division, Alhambra, Calif. Each sheet is devoted to a special type of equipment: the BC bulldozers and TC Trailbuilders, the AFB bulldozers and AFT Trailbuilders, the tractor-mounted cable-operated front-end loaders, the Type S 4-wheel scrapers, 2-wheel rear-dump scoops, cable-operated rippers, self-cleaning rotary rippers, sheepfoot tamping rollers, heavy-duty tamping rollers, rubber-tire compaction rollers, and bottom-dump wagons.

Each catalog sheet contains an illustration of the equipment, indicating its relative size and recommended uses. Text describes the features of each piece, and complete specifications are listed for each item in the Southwest line. These specifications cover weights and dimensions, capacity, type of operation and control, and other data.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

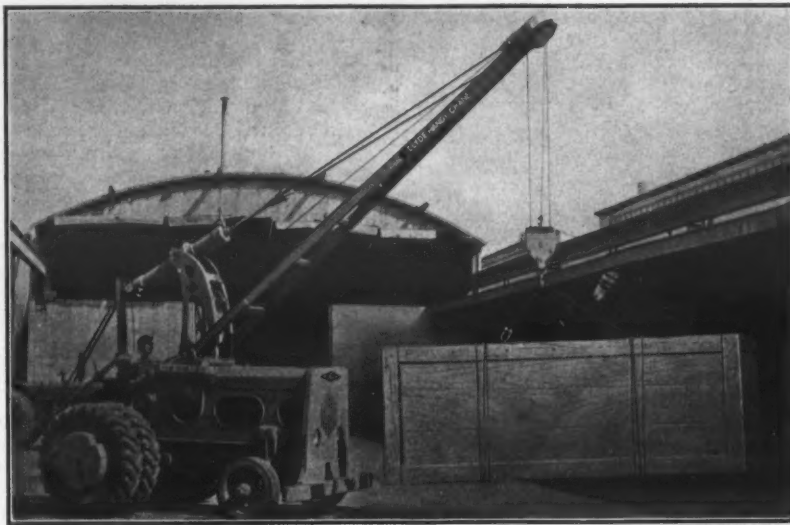
Road-School Proceedings For 1948 Are Published

Proceedings of the 34th Annual Road School have been compiled in booklet form by the Engineering Extension Department of Purdue University. In addition to reprints of papers presented at the meeting, the booklet contains a preface by Professor Ben H. Petty discussing the general aspects of the School, the program set-up, principal speakers, attendance figures, and other points of interest.

The booklet is 162 pages long and contains reports on 20 papers presented at the School. It also lists other recent publications distributed by the Engineering Extension Service. Copies of the proceedings can be secured by writing to University Editor, Purdue University at Lafayette, Ind.

Koehring Staff Changes

Major changes in its supervisory staff are announced by the Koehring Co. E. A. Brugger is named Vice President in Charge of Production. He was formerly General Manager of the Parsons Co., a Koehring subsidiary located in Newton, Iowa. E. O. Martinson has been transferred to Koehring from the C. S. Johnson Co. of Champaign, Ill., another subsidiary, where he was Gen-

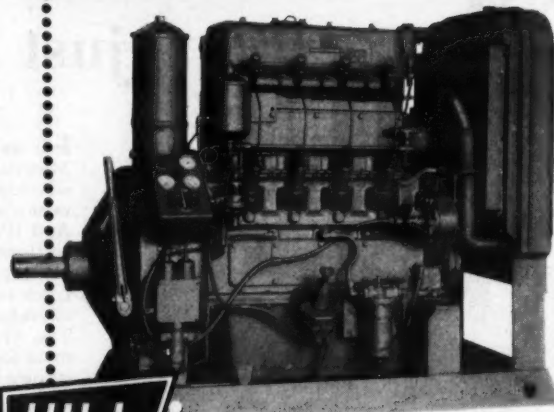


The Clyde Handi-Crane mounts on a Minneapolis-Moline UTI tractor and can lift 4 tons.

eral Manager. Mr. Martinson assumes the duties of Chief Engineer. E. W. Mass is named Vice President and Gen-

eral Manager of the Kwik-Mix Co., a third Koehring subsidiary located in Port Washington, Wis.

R for Diesel Power HILL "R" SERIES DIESELS



These packages of Diesel power are designed and built by specialists in the small Diesel field . . . pioneers who established the quarter century record of performance that makes Hill the most outstanding small engine presently available.

The "R" series engines, modern and efficient, have been sold, operated, and perfected over the past several years . . . gaining a world-wide reputation for simplicity of construction, stability of operation, and freedom from trouble.

Available in 2, 4, and 6 cylinder models, displacing 106, 212, and 318 cubic inches, respectively, the "R" series delivers from 12 to more than 50 horsepower for continuous service applications. All models are solid injection, full Diesels that start cold directly on Diesel Oil.

Power Units, Electric Generating Sets, and Marine Propulsion engines, as well as Marine Auxiliary Units are available in the "R" series. Standard equipment includes all accessories necessary for operation except starting batteries.

Hill engineers are always at your service . . . ready to study and answer your power application problems. You incur no obligation in requesting information.

A few territories still are open for qualified distributors.

HILL DIESEL ENGINE

DIVISION OF
DRAKE AMERICA CORPORATION
20 East 50th Street, New York 22, N. Y.

Pistol-Type Stud Driver

A stud driver of the explosion type is described in a catalog issued by the Powder-Power Tool Corp., 0719 S. W. Woods St., Portland 1, Oreg. The catalog tells how the Drive-It tool works and shows several photographs of it in use.

The Drive-It can be used for fastening several types of fittings to concrete, steel, wood, and other construction materials, without the need for drilling holes. It is designed to install studs, knock-off head pins, punches, driver heads, bushings, and similar devices.

In addition to the photographs and a series of letters to the company from satisfied users of the tool, the catalog also contains a partial list of standard Drive-It accessories. It shows their principal dimensions, the length and location of the threaded portions, and other details.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 70.

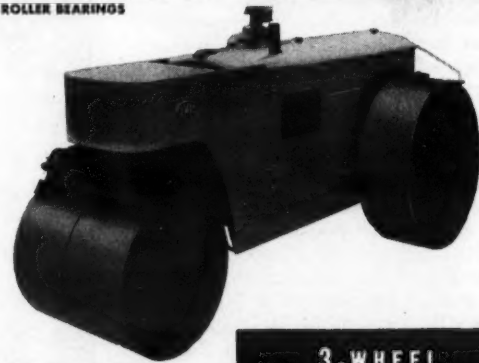


VARIABLE WEIGHT ROLLERS



- ★ 60" OR 84" ROLLING WIDTH WITH FULL COVERAGE
- ★ OSCILLATING AXLES assure uniform compaction
- ★ VARIABLE GROUND PRESSURE determined by ballast weight
- ★ ROLLER BEARINGS

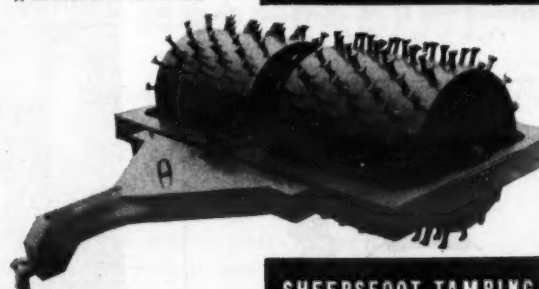
9 AND 13-WHEEL PNEUMATIC TIRED ROLLERS



- ★ 5 OPERATING SPEEDS
- ★ HYDRAULIC OR MANUAL STEER
- ★ WHEEL SPRINKLING SYSTEM
- ★ DIESEL OR GASOLINE ENGINE
- ★ RUGGED AND PRACTICAL

3-WHEEL ROLLERS

1.5 TON, 3.16 TON, 10.12 TON MODELS



- ★ 40" AND 60" DIAMETER SINGLE AND DOUBLE DRUM
- ★ OSCILLATING DRUMS
- ★ TAMPO PEAR-SHAPED FEET Assure least disturbance to already compacted areas.

SHEEPSFOOT TAMPING ROLLERS

6 MODELS

TAMPO MANUFACTURING CO.

1146 W. LAUREL TELEPHONE P-9173
SAN ANTONIO 6, TEXAS

Accidents Decreased By Advance Analysis

Howard Latham Proves That Accidents Can Be Prevented by Planning Dam Operations Ahead

♦ "THE best time to prevent job accidents is before the work starts!" And Howard Latham is proving that it can be done. Latham is the Safety Engineer for the U. S. Bureau of Reclamation at Hungry Horse Dam near Coram, Mont., and the program he and the contractors have set up should pay off.

Formerly with Liberty Mutual Insurance Co., Latham has applied the theory of advance analysis to construction work on the dam. By meeting with contractors, discussing methods, and searching out the hazards before a job begins, he has instituted a unique program. The Safety Manual of the Bureau of Reclamation is on the job, but the approach to its provisions is new.

There is currently about \$60,000,000 worth of work under way at Hungry Horse Dam, including seven contracts. The diversion tunnel is finished, and that job proved beyond all doubt that a well conceived safety program would pay off. It set a safety record for tunnel construction in the Bureau. Moreover, the Guy F. Atkinson Co. saved \$6 per foot on the tunnel, and pushed the contract through on time despite the tough work involved.

Advance-Analysis Work

Let's dig into this system and see how it works. The procedure is exactly the same for all contractors, and no favorites are played.

First of all, and possibly most important of all in advance analysis, is the personal attitude of the safety engineer. Latham's conception of safety on construction work is clear and simple.

"There are other things in the world besides safety," he begins by saying. "These contractors come here to do a job of work. Each one has plenty of details to think about besides safety, and the chances are that no matter how good a safety program we set up, it will never be letter-perfect.

"But this doesn't prevent us from setting up a safety program that's practical, one that will prevent accidents and suffering without slowing the job down. In fact, we want our safety rules to speed production on the job.

"We don't want a safety program that shuts down work. We don't want a nagging safety program. We don't want a halfway program that jumps in after an accident has happened. We want a sound, businesslike program that will cause every man on the job to benefit by it, and to respect it."

To see how Latham carries out his philosophy, let's step behind the scenes when a contractor moves in and learn what goes on.

A Contractor Moves In

The Bureau of Reclamation has just

let a \$1,340,000 contract for clearing about 7,085 acres of reservoir at Hungry Horse Dam. Other contracts are under way, also, and in their first stages they too have been through the mill of safety in a similar way. This particular clearing contract has been let to the Redding, Calif., firm of Wixson, Crowe & J. H. Trisdale—a good contracting firm, one that has the reputation of knowing its business.

Even before Red Wixson moves the first two tractors on the job—later there will be about 50 of them—Latham asks him when it would be convenient to have a little meeting. "Right now," Wixson answers. "Any time today will do."

They agree on a session that afternoon. (Continued on next page)



Bureau of Reclamation Photo

Officials of Wixson, Crowe & Trisdale, reservoir-clearing contractor at Hungry Horse Dam, discuss safety in clearing operations with Bureau supervisory personnel. Left to right: Aleck P. Ketchen, Bureau Engineer; J. H. Trisdale, contractor; W. C. Fields, Clearing Foreman; Howard Latham, Bureau Safety Engineer; and John Officer, Bureau Field Engineer. Note the protective steel hoods on the bulldozers.

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Bureau of Reclamation Photo

When Steven Anderson prepares to scale down loose rock on the left abutment of Hungry Horse Dam site, GSE Safety Engineer B. E. Wood shows him the correct method of tying off his safety line. Lines, methods of tying off, and safety belts like the one Anderson is wearing, are checked regularly by the GSE safety inspectors.

Accidents Decreased By Advance Analysis

(Continued from preceding page)

noon at USBR headquarters.

When the meeting is called to order, we see Red Wixson and J. H. Trisdale representing the contractors, Latham in the chair, and the Bureau of Reclamation represented by John Officer, Field Engineer; Aleck Ketchen, Engineer in Charge of Operations; and Fred Hodgson, the Inspector who will be in charge of the work.

Latham, who is a genial extrovert, makes sure everyone has been introduced to everybody else.

Then he says, "Gentlemen, the purpose of this meeting is to help you to work best by working safely. We want to acquaint you, first of all, with the Bureau's interest in accident prevention. We want to pass along this Bureau manual on safety regulations, which is tentatively marked wherever provisions apply to this contract.

"Most of all, we want to get together with you now to see what methods you propose to use in clearing. We know that if we talk about them now, we can make our recommendations to you now, before the work begins. In that way you can work unhampered and uninterrupted later on, when it really

means something."

"Suppose we tell you our methods and find out they won't work so well," one of the contractors says. "Suppose we want to change later on. To what extent will what we say here be binding upon us later on?"

Latham smiles. "Gentlemen, let's get this straight. You are running the job. You'll run it from the day you move in until the day you leave. The Bureau Safety Section's only purpose is to help you run it safely. You can change your methods at any time you choose. If and when you do, it's likely that we will re-study your operation at that time and perhaps offer one or two more safety suggestions."

"Well, that's fair enough," the contractor retorts. "To start with, we're going to try something new to pull down those high-standing snags. We plan to use two D8's with a long cable strung out in a loop behind, hooked to the drawbars. That way we won't kill any operators with falling limbs. We'll pile the brush with heavy bulldozers, and use machinery wherever it's possible. On some of the bad slopes we'll have to do some hand work, but not much."

Latham checks on what types of accidents have been most common to this type of operation. Falling limbs and pieces of wood from overhead have been the worst hazard, he finds. So he tells the contractors he believes it will boost production if they build a steel hood over each tractor to protect their operators. The men will be working around and under trees constantly, he explains, even though the cable is dragging the trees down behind the tractors. He also suggests placing sirens on the bulldozers so the operators can signal when they're out of sight of one another. Wixson agrees, and promises to get this work started immediately before the "Cats" hit the woods.

The men say they plan to have a camp, since the location of the work is remote from civilization. Standard rules for camp safety and sanitation are pointed out, and Latham suggests that in the early stages of the work they clear a site of all grass, rubbish, and trees in which to store fuel and oil. This will minimize fire hazards—especially important on this job where any blaze is likely to start a bad forest fire. Towards the same end, Wixson agrees to install fire extinguishers on all tractors, and to put fire-tool caches in

strategic locations on the job. First-aid facilities are discussed and provisions for transporting injured employees made.

After discussing additional operations, hazards involved, and preventive measures to be taken, Latham concludes the discussion. But not before making arrangements with Red Wix-

son to visit the job, study the actual operations, and review the schedule.

"Good luck, gentlemen," he concludes, "and if there's anything you wish to call upon us for while you're here, feel perfectly free to do so." The informal meeting is adjourned, and both sides have a clear picture of the

(Continued on next page)

what makes
some dump trucks
last longer?

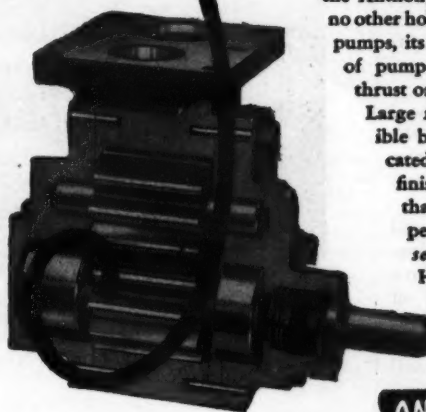
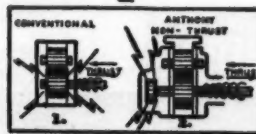


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**CONTRACTORS AND
ENGINEERS
MONTHLY**

other's problems.

Immediately after the meeting, Latham drafts an advance-analysis report which covers the basic details discussed, and sends it to the contractor over the Construction Engineer's signature. This is done not to put the contractor under compulsion, but rather to make a written record to which both parties can refer as the work gets under way. As the work progresses, additional advance analyses are submitted, based upon a study of proposed operations and discussions with the contractor.

A Contract in Operation

Next, let's see how safety operates on a contract in full swing. For this example, let's take the case of the huge \$43,500,000 contract which General-Shea-Morrison is pushing at the present time. This big contract calls for construction of Hungry Horse Dam and power plant, and is the most complicated and dangerous undertaking of the entire project.

In its initial stages, the safety program on this job covered all the obvious fundamentals. But at the first meeting both sides agreed that recommended safe practices would be added as time passed and as they became necessary.

To start with, General-Shea-Morrison furnished the Bureau with a schedule of proposed operations. From this the operations could be studied and advance safety analyses made and submitted to the contractor prior to the start of the operations. The contractor also hired B. E. Wood full time as its Safety Engineer, and Latham outlined a policy whereby all safety suggestions to contractors' men would come to them through "Woody" Wood. "So long as I am here," Latham said, "I don't want any Bureau man ever to give your men an order on safety, unless it is an immediate danger situation."

General-Shea-Morrison made insurance arrangements for the big job with the Idaho Compensation Co. The contractor built a modern first-aid station complete with X-ray emergency operating room, examination and treatment room, emergency 6-bed ward, and equipment for bacteriological examinations. The first-aid station was placed under the supervision of Miss Jessie DeVinney, RN, who has had thorough previous experience as a nurse and first-aid attendant on large construction jobs, including Fort Peck Dam. Telephone lines were strung to important work areas, ambulance service was set up for emergencies, and first-aid men were spotted on all shifts. The contractor also employed an Assistant Safety Engineer, Guy A. Bradstreet, to aid Woody Wood. Bradstreet has had eleven years of experience with the U. S. Army Engineers at Fort Peck Dam and in the Panama Canal Zone.

Project Manager "Smoky" Wood for General-Shea-Morrison, realizing that the safety program was earnest and sincere, set safety up in its proper place once and for all by writing an unusual memorandum. This memo, addressed to all foremen and superintendents, established the status of the contractor's Safety Engineer and stated that any recommendations Woody Wood made were to be complied with immediately. (Incidentally, the two Woods are not related.)



Bureau of Reclamation Photo

General-Shea-Morrison's Nurse DeVinney treats an injured employee at the contractor's emergency hospital on the Hungry Horse Dam project. The policy of immediate first aid for minor injuries reduces costly lost-time injuries.

It would be pointless to list the hundreds of safety details which have al-

ready been worked out at Hungry Horse Dam on the main contract, for

safety rules which apply at Hungry Horse might not apply at all to another situation elsewhere. What Latham believes will apply elsewhere is the method of conceiving a safeguard and putting it into effect. In fact, this method might well remove much of the general resentment which construction staffs invariably feel towards safety engineers and all their ilk.

It works this way: Job construction inspectors, armed with a copy of the advance safety analysis, are also safety inspectors. When they see something unsafe, they talk it over with the contractor's foremen, and they also make a short report on a mimeographed form to Howard Latham. Latham then makes a direct recommendation to the contractor. Or, if there is some doubt that the inspector is right, he may check the condition himself. In any case, the recommendation is then given to the contractor's safety man. Woody Wood gets action on the thing and reports back to Latham.

(Continued on next page)

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Accidents Decreased By Advance Analysis

(Continued from preceding page)

For example, on the night of July 31, 1948, Inspectors E. F. Gehri and L. B. Smith became alarmed about the lighting situation. They turned in this brief report to Latham:

"Provide adequate lighting for drillers, powdermen, and laborers on the left-abutment haul road after 8:30 p. m.

"Provide adequate lighting for excavation crews on the powerhouse access road after 8:30 p. m. Some lighting is provided on the powerhouse road, but in general it is inadequate.

"Men are required to feel their way over extremely rugged terrain on both of the above phases of construction. Some of the crews are equipped with



Bureau of Reclamation Photo

A timber canopy protects GEM employees from falling rock while they excavate the footing of a cableway tower at Hungry Horse Dam site.

flashlights, which too often are in need of fresh batteries. Newly blasted areas are extremely hazardous, especially when men are carrying equipment."

Latham looked this one over, took up his pen, and wrote, "It is important that adequate lighting be furnished in these areas." Then he passed it along to Woody Wood for some action.

Wood went out, contacted the electricians, and got more lights immediately. He didn't get all he wanted, but he improved the situation as much as possible. He then sent Latham's note back with his own notation, which read, "Work will be taken care of further as we secure men and equipment. We are more than aware of the need."

Obviously it would waste a great deal of time if, when one of these recommendations came in from an inspector, Latham jumped in his car and drove to the contractor's office to discuss the

problem. To handle this situation most efficiently, Latham simply holds the recommendations, if they are not urgent, and saves them up for Wednesday of each week.

Each Wednesday he and Woody Wood, after a thorough inspection of the job, have a private meeting of their own. Here they can get together in peace and quiet, go over the recommendations, discuss them from both sides, and agree on a solution. Then when corrective steps are taken, everyone is satisfied and pleased.

Does Latham ever "lose" in one of these situations? Certainly. He is the first to admit it.

Recently, when the job was begun, riggers started to ride loads from one point to another. Ordinarily it is not good safety practice for anyone to ride a load, and the construction inspectors

(Continued on next page)

Why some men make



IN TEXAS. Tom Popplewell, president of the Panhandle Gravel Co. at Amarillo, reports this Pioneer plant produces 125 yards of sized, washed material an hour. Pioneer equipment—a 1536 Jaw, a 40x22 Roll, a 4x12 Vibrating Screen, 48" Revolving Screen, 30" Feeder and Conveyors.



IN INDIANA. The Pipe Creek Stone Company located just outside of Sweetzer produced 100-125 tons of rock an hour with its Pioneer plant. A new Pioneer Jaw Crusher recently installed will reduce oversize . . . help produce more "pay" material.



IN WISCONSIN. Baraboo Concrete Products Company at Baraboo is getting 350 to 400 yards of clean sand and 110 to 200 yards of washed sized gravel a day with its Pioneer 305-W Washing Plant. This is their second Pioneer Washing Plant.



IN TENNESSEE. In seven months Charlie Langford's Pioneer plant at Cookeville produced over 250,000 tons of road aggregate and ag-lime. His other Pioneer plant located at Gallatin has produced over a quarter-million tons of aggregate and ag-lime in one year.



IN CALIFORNIA. Livingston Truck and Materials Co., near San Pedro, produces 300 tons of 1" minus granite an hour. Included in this big plant is a Pioneer 54 x 24 Roll Crusher, a 40 x 22 Roll Crusher, and a Pioneer 3042 Jaw Crusher.



IN ARKANSAS. The Bee Rock Quarry is producing specification rock for road construction at a 120 ton per hour clip. Pioneer equipment includes an Apron Feeder, 2036 Jaw Crusher, 40 x 22 Roll, 4' x 12' three deck Vibrating Screen, Conveyors and Storage Bins.

took less than five minutes to note it and report it to the office.

Latham took it up with Wood. He, in turn, considered it a debatable point and called in Project Manager Smoky Wood to give his views. Smoky blew his top in a polite way, and gave both men a lecture on construction economics. If he had to hire extra riggers to be on hand to make up loads, to untie loads, and to wait for loads, he said, a lot of money would be wasted and a lot of men would be standing around in each other's way.

He pointed out what that sort of ruling would do to construction costs at a time when the Bureau is trying to lower them. He pointed out that accident hazards sometimes increase with numbers of men on the job, and that the ruling might even promote accidents rather than decrease them.

He made such a good case that

Latham conceded the logic behind it. Smoky Wood agreed to keep all but experienced riggers off the hooks, under penalty of immediate discharge, and the Bureau then made an exception and permitted the riggers to go on about their work, unmolested.

"We're glad it came up," said Wood. "We don't want inexperienced men riding the loads. This way we reached a decision agreeable to everybody."

The theme of cooperation and of friendly personal relations between the Bureau and its contractors cannot be stressed too strongly here. Latham has built up this program on a basis of common sense, friendship, and mutual respect, and one of his big jobs is constantly to convince all hands that it will continue that way.

Once each month, Project Manager Smoky Wood calls a conference of all his foremen and superintendents. This



Bureau of Reclamation Photo
W. H. Murphy, first-aid attendant for General - Shea - Morrison, checks hard hats at a first-aid station on the Hungry Horse Dam site. All visitors are requested to wear hard hats, too.

is primarily a construction meeting, in which progress, methods, and equipment are discussed. But both safety engineers are invited to be there, too, and safety forms a part of this meeting. It allows the occasional friendly get-together essential to a safe job.

Once a month, too, the Contractor's Safety Policy Committee meets to consider safety problems and determine safety policy. Latham, Woody Wood, and Bradstreet attend, along with Mel Hord, Assistant to the Project Manager of GSM; James Egan, GSM Personnel Manager; John Officer, USBR Field Engineer; and John Vertrees, USBR Chief Inspector. All foremen and supervisors attend the regular safety meetings held each month by GSM. And foremen go to first-aid classes which have been set up—thirty attended the first class.

(Concluded on next page)

more money than others



IN OKLAHOMA, Miltry Brothers supply the big Hulah Dam Project with four sizes of washed specification material and sand. Pioneer Equipment includes an Apron Feeder, Jaw Crusher, Vibrating Screens, Triple Roll Crusher, Dehydrator, Bucket Elevator, Revolving Scrubber, and Storage Bins. Of course, all Conveyors were furnished by Pioneer.

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Accidents Decreased By Advance Analysis

(Continued from preceding page)

Another safety routine on this contract is the practice of submitting all construction scheme drawings to the Bureau Safety Section for a preliminary check. Most of the time no extensive changes are suggested, but the practice has paid dividends. When plans for bunkhouses were submitted to the Safety Section, for example, it was found that fire-protection measures had been inadvertently omitted. Most important of all, of course, is the fact that this system of advance analysis permits work to go ahead unimpeded once it gets under way.

One of the surest ways for a Bureau construction inspector to get himself into a peck of trouble is to pick something trivial and start yakety-yaking about shutting the job down. Latham, as well as John Officer, are quick to land on that kind of thing.

"We are all up here to build a dam, not to shut it down", they say. And the result has been a gradual improvement in the general caliber of subordinates.

What Are the Results?

The \$64 question, of course, is: "What are the results?" The results can best be illustrated by referring again to one of the contracts—this time to one that's finished. Let's look at the final record made by Guy F. Atkinson on construction of the diversion tunnel. It was a hazardous operation, but it set a safety record for tunnel construction in the Bureau.

When the final results were in, the Atkinson company had exposed men to 123,333 man-hours of tunneling danger. The frequency rate of accidents was 24.3 per million man-hours, compared to 126.3 for other Bureau contractors engaged in tunnel work. The severity rate for Atkinson was only 0.96 against 1.97 for other Bureau tunnel contractors.

Based on a study of average accident costs, Atkinson's were \$12,500 per million man-hours against \$63,150 for the other Bureau contractors, nearly five times better. Carrying the results a bit further, Atkinson saved 123 man-days of uninterrupted work—\$6,300, or about \$6.00 per foot of tunnel—by adopting a cooperative safety program.

"Be sure to put in your article the fact that the Guy F. Atkinson Co. co-

operated fully", Latham added. "Credit for good results like these isn't a one-way proposition. It comes about only when it's a cooperative enterprise, with the contractor and the Bureau acting like partners".

Incidentally, one of Latham's jobs is to compliment this kind of good showing by drafting a letter, over the construction engineer's signature, to the contractor concerned.

Some Hindsight Necessary

Hindsight is part of the safety program to a very limited extent—largely as a basis for foresight. At the end of each month a cumulative safety chart is prepared, which shows at a glance just what causes the most accidents, which foreman is having the most, and so on. Armed with this kind of information, Latham can quickly put his finger on the situation and correct it.

Office routine, investigations of the few accidents which do occur, meetings, and so on, make Latham one of the busiest men on the job. With the exception of one assistant, Rolf Huso, who takes care of part of the enormous office routine, Latham works alone.

The peskiest kinds of accidents are those for which there is no apparent excuse or explanation. A man working in the woods walks into a bush and gets a twig in his eye. Or on a Sunday morning, at the end of the graveyard shift, a driller leaves established trails, starts to run down the mountainside, and winds up at the bottom with a broken arm and bruises all over his body.

And then, of course, there is the worst kind of accident of all for the safety engineer. It happened last winter on this job. Latham had recommended that the camp streets be sanded since they were covered by snow and ice. A crew was preparing to do the work, but about 24 hours elapsed before they got around to it. In the meantime, Latham left his office for a moment and walked to his car where he'd left some data he needed for a routine report. He didn't get around to making that report for the next seven days, because his feet slipped.

They said at the hospital that it was one of the neatest fractured ankles they had ever seen.

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The Sheldon hand pump is designed for filling fuel tanks on tractors, trucks, etc. The pumping handle is at the nozzle so the operator can see when the tank has been filled.

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inspection of the flow of fuel into the tank as it is being filled.

The Sheldon pump is designed to lift gasoline to a height of 15 feet or more, and to pump at rates up to 15 gpm. It will prime itself when dry, the manufacturer states, and can be quickly drained by a pull on the handle. A removable strainer is located at the lower end of the fuel supply tube. The pump weighs 7½ pounds and is furnished with 10 feet of 1-inch Neoprene hose.

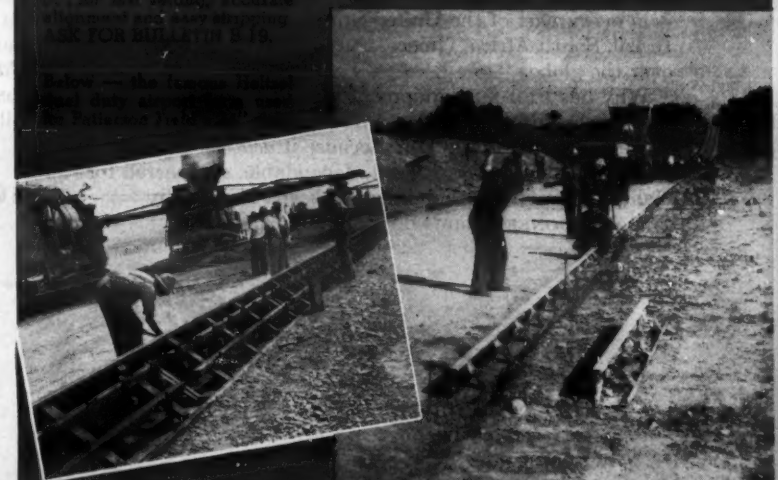
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 42.

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Carl W. Brown has succeeded to the Presidency of the American Association of State Highway Officials. This position was left vacant by the resignation of Wesley W. Polk. Mr. Brown is Chief Engineer of the Missouri Highway Department, and was First Vice President of the AASHO.



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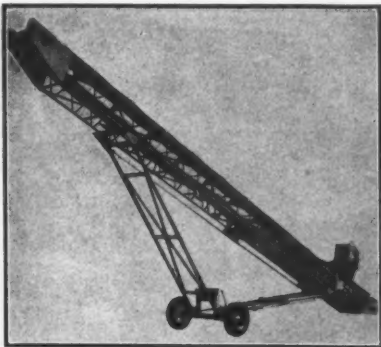


Ordinary shovels are 15 gauge steel overall; RAZOR-BACKS are heavy 13 gauge up thru the center, to strengthen the cutting edge, frog and socket, and tapered to 17 gauge at the sides where shovels never wear out. They wear much longer yet weigh no more.

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A self-contained hydraulic hoist lifts this Universal Engineering Corp. portable conveyor as high as 21 degrees in 10 minutes and lowers it to traveling position in one minute.

Portable Conveyor Has Hydraulic Hoist

A portable conveyor with a self-contained hydraulic hoist is announced by The Universal Engineering Corp., Division of Pettibone Mulliken Corp., 620 C Ave., N. W., Cedar Rapids, Iowa. The hoist is designed to lift the conveyor to an angle of 21 degrees in 10 minutes, or to lower it to traveling position in 1 minute. The Universal conveyors are available in lengths of from 32 to 52 feet, in multiples of 4 feet; and in 18, 24, and 30-inch widths.

Features claimed for the hoist include anti-friction bearings throughout, sealed-for-life bearings in triple-roll and return rollers, extra-heavy head and tail shafts and bearings, 24-inch belt take-up on the tail pulley, and self-cleaning of the tail pulley and belt scraper for protection of the return belt. The conveyor may be driven by gasoline, diesel, or electric power. According to the manufacturer, the balanced mounting permits one man to lift the conveyor to attach it to a truck hitch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 100.

Service for Contractors

Bidding Jobs in Alaska

A specialized service for contractors planning to bid on Army construction projects in Alaska is described in a folder prepared by Traffic Engineering & Distributing Co., Inc., 605 New World Life Bldg., Seattle 4, Wash. This company is prepared to handle all purchas-

ing, shipping, packing, crating, warehousing, personnel procurement, and processing for Army contract work in Alaska.

The folder describes in detail the services Tedco is prepared to render. It explains how they leave the contractor free to concentrate on actual problems of construction and make it unnecessary for him to open a Seattle office.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 43.

Moles Make Awards

Citations for outstanding construction achievement were presented to two builders at The Moles award dinner held last month in New York City. The Moles, an organization whose membership is restricted to tunnel and heavy-construction men, presents the awards each year—one to a member, and one to a non-member. J. Rich Steers, President of the group, made the presenta-



Winners of the 1949 Moles Award for outstanding construction achievement are (left) Luther S. Oakes, President, Winston Bros. Co. of Minneapolis, and Captain Thomas A. Scott, Chairman of the Board, Merritt-Chapman & Scott Corp. of New York City.



tion of bronze plaques.

Luther S. Oakes, President of the Winston Bros. Co., Minneapolis, received the non-member award. The

member award went to Captain T. A. Scott, Chairman of the Board of the Merritt-Chapman & Scott Corp. of New York City.



ONLY MACK offers this matchless Balanced Bogie with exclusive Power Divider. Unusual flexibility and balance insure even tire loading and uniform braking; cancel out weight transfer. Mack Power Divider assures good going by transferring power to wheels maintaining the best traction.

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Built to

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...and TAKE IT AWAY

in bigger loads . . . on faster schedules . . . with greater profits

Mack six-wheel trucks are built to "take it" when it comes to taking out the big loads with power and stamina to spare.

Powerful gasoline or diesel engines! Massive, heat-treated alloy steel frames! Flexible rubber Shock Insulators! Air Assist Clutch and Power Steering! Mack's famed Balanced Bogie and Power Divider! These are your assurance of power and strength for the heaviest loads; maneuverability and ease of control for fast loading and unloading; flotation and traction for the most slippery mud or sand.

Whether for heavy highway hauling or super-duty off-highway work, Macks are designed with more outstanding and exclusive features than any other truck—features that mean greater profits through stepped-up tonnage on faster schedules. It will pay you to get the full story in terms of your particular operation. Write or call your nearest Mack branch or dealer.



IT'S PART OF THE LANGUAGE:

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Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Limited.

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Absolutely waterproof and windproof . . . Patterned roomy to be worn over regular clothing.

The IPCO Utility Rain Suit consists of coat, pants and detachable hood. Double texture fabric with a sheet of solid rubber vulcanized in between assures waterproof qualities. Olive drab color.

Write for Bulletin D-39



Safety Equipment for all Industries

INDUSTRIAL PRODUCTS COMPANY

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Sheet Asphalt Laid On a Concrete Base

**City Street Pavement Is
42 to 54 Feet Wide With
Crack-Control Features
In Both Slab and Top**

PROVIDENCE, R. I., has recently reconstructed a 2.84-mile section of Broad Street, into which funnel the major traffic arteries from the south. The new pavement begins in the civic center of the state capital where Weybosset, Broad, and Chestnut Streets all meet. It continues south on Broad Street (which carries such highway markers as U. S. 1 together with State Routes 2, 3, and 117) past Roger Williams Park, and terminates at the city line of Cranston, an adjoining community.

The project was financed jointly by the City of Providence and the Federal government, and was constructed by the Campanella & Cardi Construction Co. of Hills Grove, R. I., under the supervision of the Rhode Island Department of Public Works, Division of Roads and Bridges. The total cost was around \$658,000.

The job got under way the latter part of July, 1948, and by the end of October the pavement was completed. The laying of sidewalks was also completed before the end of 1948. But the installation of signals will be completed in 1949. The contract completion date has been extended to June 30, 1949.

Sheet Asphalt on Concrete Base

The new pavement consists of 3 inches of sheet asphalt laid on an 8-inch non-reinforced concrete base. It has a variable width between curbs of from 42 to 54 feet. In back of the granite curbs on both sides are sidewalks from 6 to 13 feet wide. The sheet asphalt was laid in two 1½-inch courses, binder and surface. The concrete base has contraction joints at 20-foot intervals designed to control cracks in the pavement. This crack control was extended upward into the sheet asphalt by inserting strips of paper into the black-top surface course at the same spacing.

Broad Street had previously been paved with sheet asphalt that had needed replacement for several years. Through the middle of the pavement ran the double tracks of an old trolley-car line which had been replaced with gasoline-driven buses. The buses in turn are now giving way to a trackless-trolley system which will operate over the new pavement as soon as new poles are erected to support the overhead wires. The obsolete poles for the old trolley line have been removed.

For the first ¾ mile in downtown Providence, the old sheet-asphalt pavement had been laid on a stone base, but the rest of the base course was a 6-inch layer of plain concrete. As the old pavement was removed, the roadway width was increased 2 to 3 feet for about ½ mile in the business district by setting back the curb line wherever possible to a minimum width of 42 feet. For the first mile, an average width of 46 feet was possible, and as the downtown sec-

tion was left behind, the roadway widened out to 54 feet—a width which was held for the remainder of the job. During the course of the work, about 100 fine old trees were removed to make room for the widening.

Grading

The four old trolley rails were removed from the street by the United Electric Railways Co. before the contractor moved in to begin grading operations. Using three Link-Belt Speeder shovels—two 1¼-yard models and a 1½-yard unit—Campanella & Cardi Construction Co. had no difficulty digging out the old non-reinforced concrete base with the asphalt top. The material was loaded into a fleet of 18 to 20 trucks and hauled an average of



C. & E. M. Photo
Bakers, following an Adman Black Top Paver, level hot-mix along curbs during Campanella & Cardi's street-reconstruction contract in Providence, R.I.

1½ miles to the Providence Sewer Department yard. There it was stockpiled for use on any fills that the City may want to build.

Some dirt was also removed along with the old paving material to make room for a gravel foundation course
(Continued on next page)

Maintenance made easy and economical with the OLIVER-HENKE MAINTAINER



Here's a light, economical road maintainer that gives you many features usually found only on much heavier, more costly machines. Rugged construction . . . finger-flip hydraulic controls . . . blade angle easily adjusted from driver's seat . . . leaning wheels . . . hydraulic scarifier . . . hydraulic steering . . . 12-foot blade . . . plus many other important advantages are yours with the OLIVER-Henke Maintainer.

The powerful OLIVER Model 88 Industrial Tractor gives the unit plenty of power for economical maintenance of gravel and dirt roads and light ditching work. The famous OLIVER

"Fuel Miser" engine with variable speed governor assures minimum fuel consumption. The entire unit is easily accessible for service. All wearing parts can be inexpensively replaced if necessary. And, if desired, the tractor can be readily removed from the Maintainer and a front-end loader quickly installed.

For efficient, economical road maintenance, the OLIVER-Henke Maintainer will effectively augment your heavy equipment and do a large share of the work at reduced operating costs. Ask your OLIVER Industrial Distributor to show you the outstanding economy of this unit.

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Every part for every G.I. type vehicle from jeep to 20-ton prime mover exs. 40% to 80% below list.

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New - used - rebuilt Truck operators, dealers, garagemen, learn about amazing low prices.

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A Complete Line of Crawler and Industrial
Wheel Tractors



"THE SIGN OF
EXTRA SERVICE"

that was spread the width of the roadway. In the track area where the ballast, ties, and rails had been removed, an 11-inch layer of gravel, 18 feet wide, was spread and compacted. For the rest of the roadbed, the gravel blanket was 4 to 5 inches deep.

Nearly 17,000 cubic yards of gravel was purchased at a pit in Warwick, R. I., at a price that included loading the material into trucks. Five trucks hauled the gravel 8 miles to the job, where it was dumped, then spread by a Caterpillar D4 tractor-dozzer, shaped to grade by an Adams motor grader, and compacted by a Buffalo-Springfield 14-ton 3-wheel roller.

While the street was torn up, ducts and conduits were installed for the traffic-light system. During all the construction operations, traffic was maintained by working on only half of Broad Street at a time. The west side of the pavement was completed first, beginning in downtown Providence and working south to the outskirts of the city. To channel traffic properly at Trinity Square—from which six streets radiate—a network of raised traffic islands was built, complete with curbs and concrete pavement.

Concrete Base Course

For constructing the 8-inch plain-concrete base course, the contractor set up a batch plant near the Melrose Street siding of the New Haven Railroad, only a few blocks from the center of the job. During the course of the paving three different makes of bulk portland cement were used—Alpha, Lone Star, and Penn-Dixie. The cement was unloaded from the cars by a worm screw gear beneath the siding track, and raised by an enclosed elevator to a Blaw-Knox 300-barrel cement bin.

Fine and coarse aggregate was supplied by J. D. Anthony of Seekonk, Mass., with delivery to the plant handled by trucks. As the material was dumped on the ground, it was either stockpiled or loaded into a Blaw-Knox 110-ton 3-compartment aggregate bin—two compartments for the stone and one for the sand—by a P&H crane equipped with a 60-foot boom and a 1½-yard clamshell bucket.

Batch trucks hauled the cement and aggregate to a Rex dual-drum paver where the materials were mixed with water tapped from the fire hydrants along the curbs. Batches were dumped on the subgrade between Blaw-Knox 8-inch road forms set up for paving half the width of the street at a time. Expansion-joint material, ¼ inch thick, was placed against the curbs. The concrete was spread out by hand with puddlers doing the leveling, and rough-floated with a long-handled lute. No smooth finish was essential to this base-course work. At 20-foot intervals a 3¼-inch steel strip was embedded in the soft concrete; it was removed later, before the mix hardened. The thin groove, which was poured with asphalt, was intended to serve as a contraction joint to control cracks occurring in the slabs.

In the forms along the center of the street for the first half of the paving, a fiber keyway was installed to effect a bond between the two lanes. Broad Street was kept open at all times, as were the intersections to the side streets designated as fire lanes. On fifteen side streets, half of the approach intersection was paved as a fire lane, with 3 extra bags of cement to the batch in order that half the width might be opened in three days instead of the usual six days. This was done so that emergency traffic such as fire-department vehicles, ambulances, and even garbage trucks could get in and out with little trouble. For curing, the base course was sprayed with Stonhard compound.

Sheet-Asphalt Pavement

The sheet-asphalt pavement was laid

in two courses—1½ inches of binder and 1½ inches of surface. The material was mixed in the contractor's commercial plant at Hillsgrove, R. I., a Cedar-apids permanent set-up with a 1½-ton pugmill. A fleet of eight trucks—six Autocars and two Macks—hauled 8 to 15 tons a load an average of 8 miles to the job. The trucks discharged their contents into an Adnun Black Top Paver which laid the hot-mix in 12-foot lanes. This width was easily increased to accommodate the varying width of the street by having the rakers feather the material out to the side as it was laid by the machine.

The hot-mix paving was also done half the street width at a time, beginning at the low side next to the curb and working towards the center. Each course was compacted by two Buffalo-Springfield rollers, the first pass by a 10-ton tandem roller, and the second pass by a 14-ton 3-axle roller. As usual on a street-paving job, the rakers played an important role in leveling

(Continued on next page)

NEW, FASTER Way to Drive or Remove Nuts, Bolts, Cap Screws



Van Dorn
IMPACT
WRENCH

This great, new Van Dorn Impact Wrench is sure to save you time and money on assembling and disassembling jobs! Powerful and sturdy—delivers 2000 rotary impact blows a minute. No uncomfortable jarring or twisting—no "fighting" the Wrench to get results. Easy to remove fasteners, even the stubborn "frozen" ones. Motor cannot be stalled—even if spindle is stopped "dead"—so there's no danger of overload or "burn-out." Weighs only 8¼ lbs. Full ¾" capacity. Ask your nearby Van Dorn Distributor for details. Write for free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Maryland.

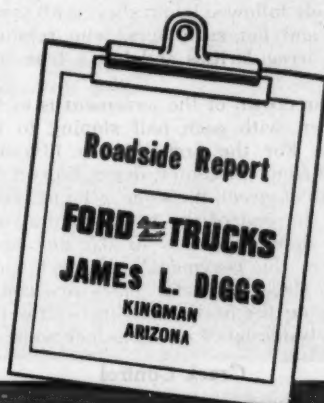
For Power
Specify

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

PORTABLE ELECTRIC TOOLS

"FORD F-8 Big Jobs outperform all other trucks in their class!"



"MY BONUS BUILT Ford F-8 Big Jobs, averaging 46,000 lbs. gross, are outperforming all other trucks in their class," reports Mr. James L. Diggs. "Gas mileage is 6 miles per gallon. The engine on one F-8 has never felt a wrench, except for changing one set of points and two fan belts. My run takes us over a mountain range and through the intense heat of the Colorado River Valley."

Mr. Diggs is one of many big-time haulers who give the Ford Big Jobs a great big hand. Owners report the 145-horsepower engine outperforms anything in its class. They offer plenty of proof that it outsaves many engines much smaller in size. Drivers report that the new Ford Million Dollar Cab can't be beat for comfort. Ford Big Jobs for '49 are Bonus Built... like the other 139-plus models in the full line of Ford Trucks. Bonus Built is the superstrong construction that contributes to long truck life. Life insurance experts prove Ford Trucks last longer.



BUILT STRONGER TO LAST LONGER

USING LATEST REGISTRATION DATA ON 5,444,000 TRUCKS,
LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

ONLY THE FORD BIG JOB HAS ALL THESE FEATURES!

- ★ New 145-h.p. Ford V-8 engine for top performance.
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- ★ New heavy duty 5-speed transmissions for operating flexibility.
- ★ Big Ford power-operated brakes for sure-footed stopping; rear 16-inch by 5-inch on the F-8.
- ★ Ford Super Quadrax 2-speed axle with vacuum shift for performance flexibility in Model F-8 (single speed axle also available); single-speed Quadrax Hypoid Axle in Model F-7.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Exclusive Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.



Above, two Buffalo-Springfield rollers compact a course of hot-mix on the Broad Street reconstruction job in Providence, R. I. In the other photo, left to right, are Santi Campanella of Campanella & Card Construction Co.; Roland Gignac, Assistant to the Resident Engineer; Nicholas Abbenante, Superintendent; Walter M. French, Resident Engineer; and Edgar T. Fedell, General Superintendent.

Sheet Asphalt Laid On a Concrete Base

(Continued from preceding page)

the mix adjacent to the curb and around catch basins and manholes. They were closely followed by finishers with tampers and hot smoothers, who removed any irregularities and left a true surface.

The crown of the pavement is in the center, with each half sloping to the curb. For the first 11½ to 13½-foot strip from the center, depending on the width of street, the slope is 1.5 per cent. For the rest of the width to the curb the slope increases to 3.5 per cent. Where the pavement is 46 feet wide, four 11½-foot traffic lanes are available; on the 54-foot paving widths the four traffic lanes are 13½ feet wide.

Crack Control

The locations of all the transverse crack-control steel plates in the concrete base course were clearly marked on the curbs so that this crack-control feature could be installed into the sheet-asphalt surface course. After the first pass of the tandem roller over this top course, a chalk line was snapped on the asphalt surface to coincide with the crack in the concrete base. A groove from ¾ to 1 inch deep was then made with a hot cutting spade by following the chalk line. Into this freshly cut joint a single strip of heavy manila paper, ¾ inch in depth, was inserted, and worked down until it was even with, or below the top of, the asphalt surface. Then the 3-axle tandem roller made its final pass over the top course.

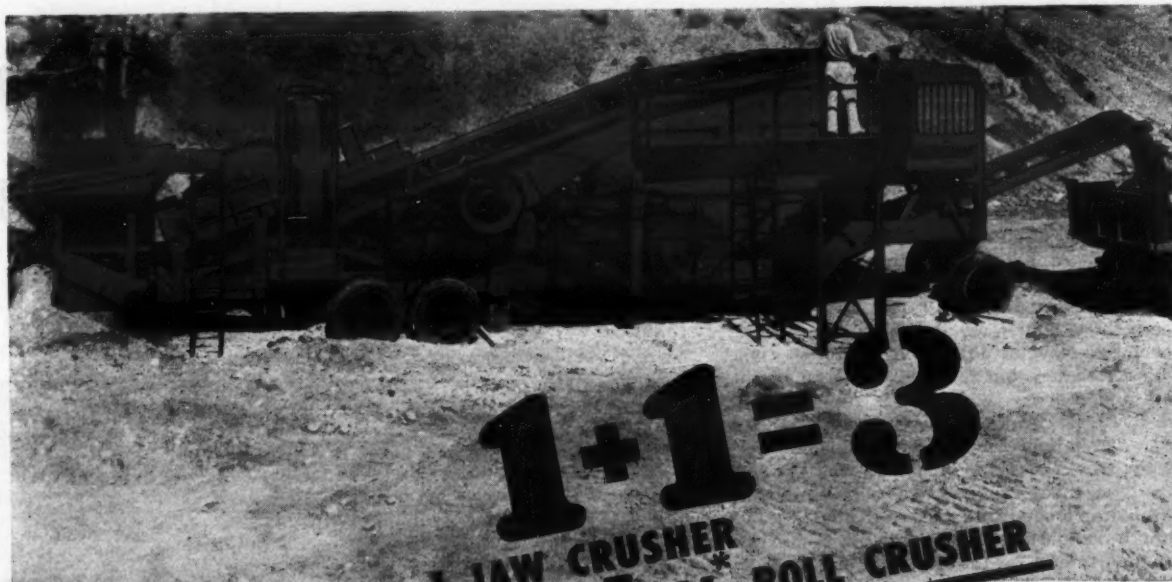
In this way any cracks that may appear in the pavement can be controlled and confined to definite limits. The cutting spades, rakes, shovels, and smoothers were all heated on a Hauck kerosene-burning torch which was carried on the paver. Both the binder and surface course were laid at temperatures varying between 250 and 325 degrees F.

The Mix

The 60 to 70-penetration asphalt used in the mix was supplied by the Texas Co. Sand and stone aggregate came from the Rhode Island Sand & Gravel Co. of Hills Grove, R. I. In the binder course the maximum stone size was ¾ inch; no stone was used in the surface course, only sand, mineral filler, and bitumen.

The composition of the binder course called for from 4 to 6 per cent bitumen, with the following gradation on the stone and sand:

(Concluded on next page)



**1 JAW CRUSHER
1 TWINDUAL* ROLL CRUSHER
3 STAGES OF REDUCTION**

INCREASE PRODUCTION 50 to 100%

**Reduce cost per yard with
Universal's TWINDUAL Master Gravel Plant**

Here's the gravel plant designed to serve your requirements now and for a long time to come. Universal "Stream-Flo" engineering sets the standard for high production and ready portability with three full stages of reduction in a single-unit plant.

Proved in performance, proved in profit-making capacity, the **TWINDUAL** Master will outproduce conventional plants of comparable size and weight by 50 to 100%.

This modern plant features a Streamline jaw crusher in the first stage, and the **TWINDUAL** Method* of secondary reduction in the second and third stages. This exclusive Universal development gives all the advantages of two separate roll crushers without the bulk and weight . . . primary capacity is doubled, jaw crusher maintenance reduced. The over-all result is **TOP CAPACITY AT LOWEST COST PER YARD**. For complete details write for Bulletin No. 682.

THE UNIVERSAL ENGINEERING CORPORATION
620 C Avenue N. W. Cedar Rapids, Iowa

A Division of PETTIBONE MULLIKEN CORPORATION • Chicago • New York

For gravel requiring a large opening use crusher and 2540 Paver also features the TWINDUAL method. Ask for Bulletin 3144.

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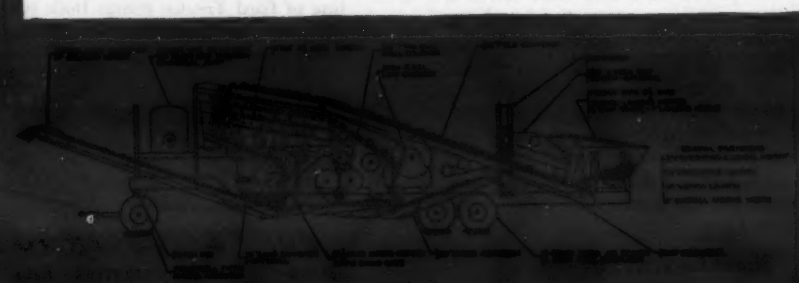
Designers and builders of "Stream-Flo" rock, gravel, and lime plants, screening and washing plants, conveyors, apron feeders.

OTHER PETTIBONE MULLIKEN PRODUCTS . . . Pumps, Cramshell and Dragline Buckets, Speed Loaders, Snow Loaders, Conveyors of all kinds, Car Unloaders.

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A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

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Sieve Size	Per Cent Passing	
	Stone	Sand
1-inch	100
3/4-inch	95-100
3/8-inch	0-15
No. 4	100
No. 80	....	10
No. 200	....	5

The sheet-asphalt surface, known as Class J, Type J-1, contains from 9½ to 12 per cent bitumen, and the gradation of sand and mineral filler was:

Sieve Size			Sieve Size Mineral Filler	
Passing	Retained	Sand	Passing	Filler
No. 10	....	98-100	....	....
No. 10	No. 40	14-30	No. 30	100
No. 40	No. 80	30-60	No. 80	95
No. 80	No. 200	16-40	No. 200	75
No. 200	....	0-5		

Sidewalks

Over the lower 2 miles of the job the sidewalks are 13 feet wide; they are from 6 to 10 feet wide in the downtown business section. Granite curb is standard throughout. Where the sidewalk had to be torn up during the construction operations, the City and Federal government divided equally the cost of the replacement. In places where the existing sidewalk was not affected by the construction, but where the City decided that a new walk was necessary, the property owner was assessed half the construction costs and the other half was paid for by the Federal government.

Different types of sidewalks were laid, either granolithic or monolithic cement-concrete, or pre-mixed bituminous material, according to what was there originally. Throughout most of the job, a monolithic type of sidewalk was laid 4 inches thick, using a 1 : 2 : 4 mix. The white-colored granolithic sidewalk consists of an 8-inch gravel foundation course on which a 3-inch Class C concrete base was laid, using a 1 : 2½ : 5 mix. This was topped with a 1-inch surface course of 1 : 2 sand-cement mortar. Every 50 feet there is a cork expansion joint, ½ inch thick and 3½ inches high.

The black-top sidewalk has a 6-inch gravel foundation course which is covered by a 4½-inch gravel base course, followed by a 1½-inch bituminous-concrete top course.

Since the weather was not severe, the concrete sidewalks could be laid after the roadway pavement was completed in October. Heated aggregates were used at the contractor's ready-mix plant, and calcium chloride was put in the mix. Batches were delivered to the job in Smith 5-yard truck-mixers on one or more Autocars. Curing was done with Rite-Cure spraying compound, and the sidewalks were covered for 24 hours with heavy burlap mats. A couple of Hough Payloaders excavated for sidewalks and looked after the gravel backfill around the job.

Quantities and Personnel

The major items included in the contract for the paving reconstruction of 2.84 miles along Broad Street were:

Unclassified excavation	16,291 cu. yds.
Removal of asphalt pavement and concrete base	95,587 sq. yds.
Removal of base, ballast, ties from track area	7,641 cu. yds.
Gravel foundation	14,766 cu. yds.
Concrete base course, 8-inch	93,137 sq. yds.
Sheet-asphalt pavement	93,611 sq. yds.
Manholes	237 ea.
New granite curb	5,489 lin. ft.
Removal and resetting of old granite curb	10,908 lin. ft.
Cement-concrete sidewalks	19,627 sq. yds.
Bituminous-concrete sidewalks	1,993 sq. yds.

A force of 80 men was employed on the project under the personal direction of Santi Campanella, a member of the firm of Campanella & Cardi Construction Co. Edgar T. Fedeli is General Superintendent of the company, and Nicholas Abbenante was Superintendent on the Broad Street project.

For the Rhode Island Department of Public Works, Division of Roads and Bridges, Walter E. French was Resident Engineer, assisted by Roland Gignac. The Division is headed by George H. Henderson, Principal Highway Engineer; Lee V. Spencer is Road Con-

struction Engineer.

The plans for the job were prepared by Andrews & Clark, Consulting Engineers of New York City.

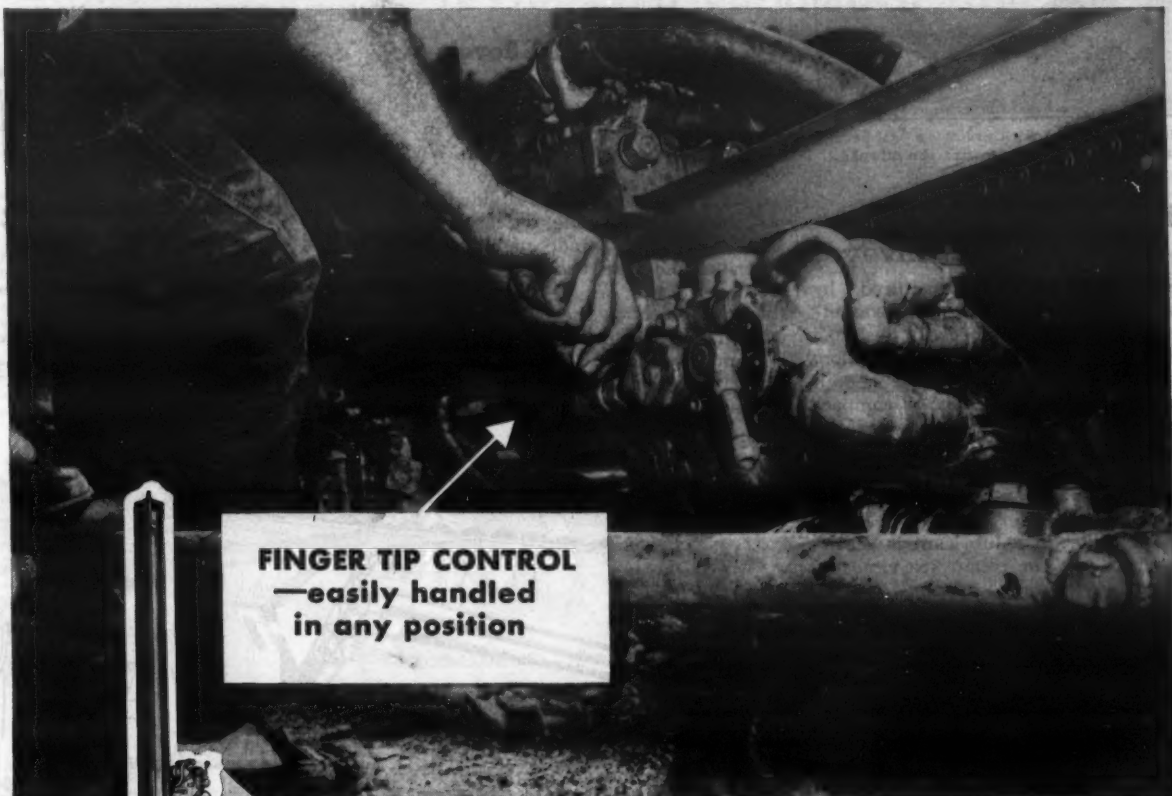
Data on Road Equipment

A line of construction and maintenance equipment is listed in a pocket-

size folder issued by the Rosco Mfg. Co., 3118 Snelling Ave., Minneapolis 6, Minn. Rosco units described in this bulletin include the Model RQE distributor; the Model RMT maintenance heating and spraying unit; the Model RAD oil and water applicator; the Model MAD for dispensing measured quantities of water in soil-stabilization,

soil-cement, and dust-laying operations, the Model MFR 1,000-gallon 2-wheel flusher; the Model B7 road sweeper. Also described is the Rosco-Odometer, a device for measuring linear distances while traveling in a car.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 10.



FINGER TIP CONTROL
—easily handled
in any position



The PIONEER and still the LEADER!

JOY LIGHTWEIGHT WAGON DRILL

Introduced by JOY
8 years ago—hundreds
in use, nation-wide . . .

HERE'S WHY:

- MORE HOLE PER SHIFT with the exclusive "drill and blow" feature.
- REALLY LIGHTWEIGHT—only 750 lbs.—less than half the weight of conventional wagon drills.
- Easily operated by ONE MAN; mounts JOY 3" or 3½" drifters, or 55 or 65 lb. sinkers.
- POSITIVE LOCKING BRAKES—requires no spikes.

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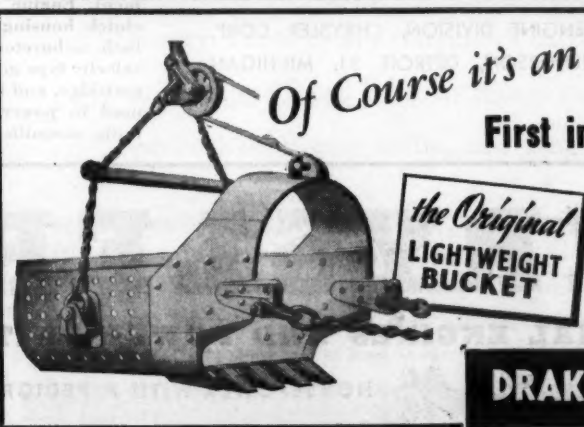
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Joy Engineer*

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.
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Of Course it's an

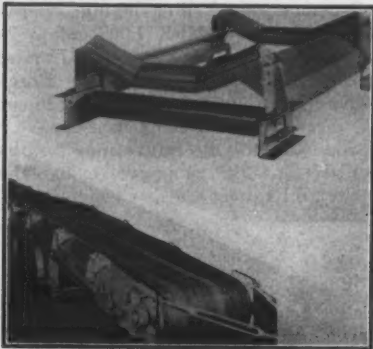
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the Original
**LIGHTWEIGHT
BUCKET**

Omaha Dragline Buckets with an increased capacity of over 25 per cent make more money load by load, job by job, because they move Paydirt instead of steel. The combined experience of hundreds of contractors operating under all conditions have been built into these buckets. Omaha Buckets dig easier, carry a bigger load, dump cleaner.

Write for catalog

DRAKE-WILLIAMS-MOUNT • OMAHA, NEBR.



Idlers equipped with precision ball bearings in each roller feature the Transall conveyor.

Idlers Are Feature Of New Belt Conveyor

Belt conveyors manufactured by Transall, Inc., 109 N. 11th St., Birmingham 4, Ala., feature specially designed idlers; minimum height of head section, main chassis, and tail section; a spill shield to protect the belt; a compact drive and power unit; a self-cleaning tail pulley; and return idlers assembled in a composite unit with the troughing idlers.

The Transall idler has ball bearings in each roller. The lubricant is sealed in and is said to retain its viscosity through a wide range of temperatures. Re-lubrication is accomplished in a one-shot operation. The rolls are mounted on a cushion of Neoprene to eliminate shock on the bearings, reduce vibration, and provide automatic self-alignment of the bearings. A cleaning edge is built onto the frame of the idlers to prevent the build-up of sticky materials. The idlers are mounted in standard widths and are available as individual units or assembled into sections.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 95.

Strain Gage Warns Of Crane Overload

A magnetic strain gage designed to warn operators when equipment is overloaded and is in danger of upsetting, or when safe limits are being approached, is announced by the Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa. The device consists of a strain gage enclosed in a watertight case and a pilot bar which is sensitive to forces of as low as 20 pounds.

The Westinghouse gage is mounted on a supporting member of the equipment, and a controller with an indi-

cating dial is located wherever desired near the operator. The gage box measures $3\frac{1}{2} \times 8\frac{3}{4} \times 3\frac{3}{4}$ inches. It is operated from a single-phase 110-volt 60-cycle power supply, and, according to the manufacturer, it draws 35 volt-amperes of power.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 125.

Line of Hand Shovels

Those tools found on every construction job—shovels, spades, and scoops—receive full treatment in a catalog made available by The Wood Shovel & Tool Co., Piqua, Ohio.

General Catalog J is divided into six sections, each one listing a particular brand or grade of shovel. It describes the steel used in the manufacture of the Wood line, the care shown in selecting the proper types of wood for the shovel handles, and the I-beam handle reinforcement designed to increase the strength of shovels at

points where they suffer the severest strains.

Each item in the Wood line is illustrated in this 56-page catalog. With each illustration is a list number of the item, its blade dimensions, its weight, the metal used in the construction of the blade, and the grade of handle.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 102.

Riehle Agent in the West

Howard E. Pellett has been appointed Sales Engineer in the west for the Riehle Testing Machines Division of American Machine & Metals, Inc. He will cover the states of California, Nevada, and Arizona, and will maintain two offices: one at 1201 Folsom St., San Francisco, and the other at 416 W. 8th St., Los Angeles.

ONCRETE

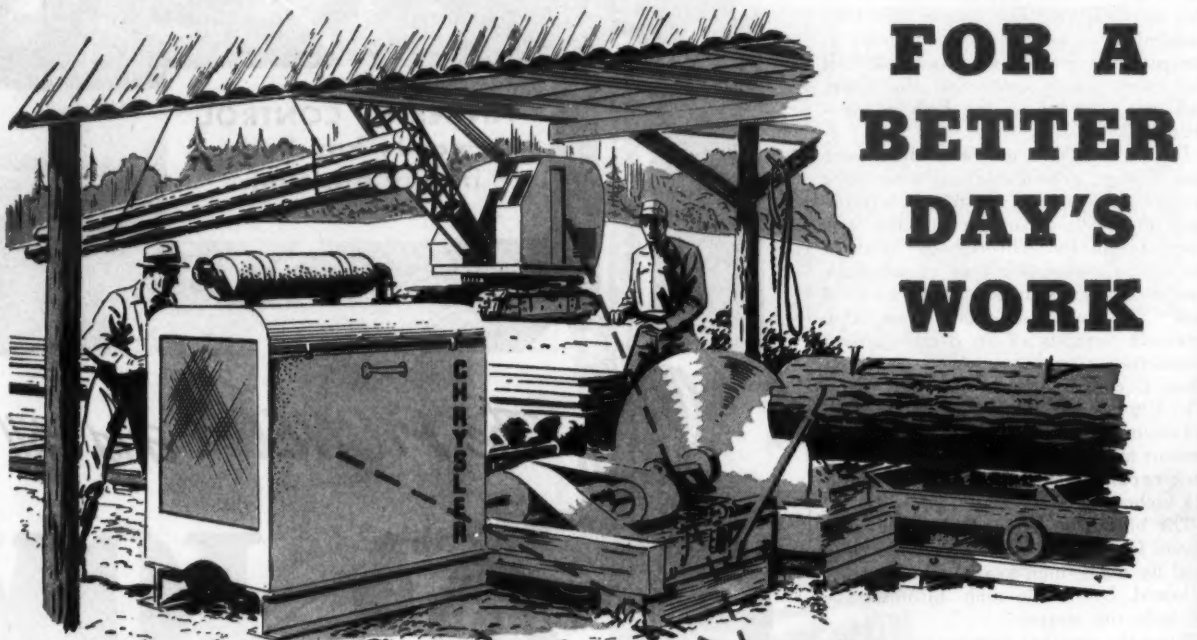
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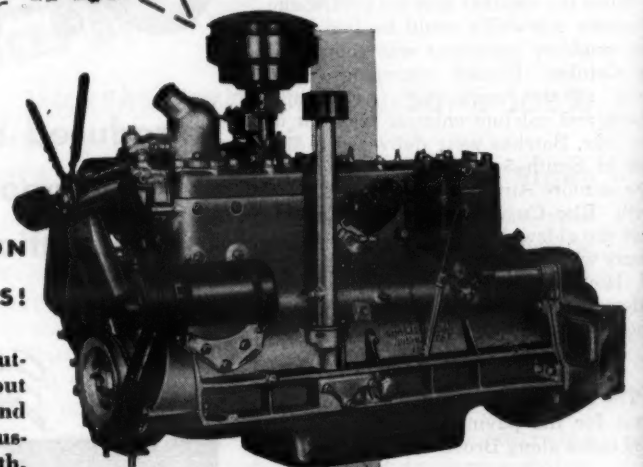
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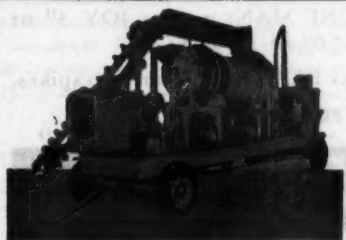
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INDIANA

Winston-Utah Rushes Big Reclamation Job

3,500 Feet of Concrete Lining per Week Despite Tough Obstacles on Big Irrigation Canal

FOR years, the hardest problem on western irrigation-canal work has been the development of trouble-free machines to trim the canal banks and to place the concrete lining. Almost always, the use of trimmers and slip forms has been complicated by unforeseen mechanical deficiencies. But today, on one of the toughest canal projects in the west, the development of a slip form that is trouble-free is a reality.

The job is on East Low Canal, a link of the vast Columbia Basin reclamation project. There the joint-venture firm of Winston Bros. Co. and The Utah Construction Co. is building 11.9 miles of the big water-distribution system under a \$4,000,000 contract with the Boise Office of the U. S. Bureau of Reclamation. The job is composed of 10.8 miles of open concrete-lined canal and 1.1 miles of reinforced-concrete siphon work.

In the first five months of service on this project, the slip-form liner was down for only 30 minutes—with a burned-out vibrator. And while there was some trouble in rock and boulders with the trimmer, the difficulty was corrected as soon as the tough places were undercut and backfilled with material suitable for the trimmer to work.

The job was originally scheduled for a concrete-lining rate of 300 feet per day with one concrete mixer, but the special slip forms worked so well that two 34-E pavers were put in use, and as much as 759 feet of lining has been placed in a 10-hour run.

Design of East Low Canal

The East Low Canal ultimately will be 130 miles long, and will carry enough water to irrigate 252,000 acres. From the division works of the Main Canal, 6 miles east of Soap Lake, Wash., the East Low Canal will extend southeast the length of the job and terminate in the Snake River Valley 8 miles northeast of Pasco. The section recently constructed will thus carry Columbia River water from the gigantic pumping plant at Grand Coulee Dam towards the thirsty acres to be irrigated.

The canal now under construction is rated at a carrying capacity of 4,500 cubic feet per second. Lined portions will average 76 feet wide at the water surface and 20 feet wide at the bottom. Some of the unlined sections of this canal, to be built later, will be 73 feet wide at the bottom.

In general, the new canal averages 21.6 feet deep from the concrete bottom lining to the berm at the top. Side slopes are 1.5 horizontal to 1 vertical, and the lining is 4½ inches thick. Low-alkali portland-cement concrete, without reinforcing, was used, except in selected spots where foundation conditions warranted the use of steel.

The system of contraction joints in the lining is somewhat more extensive than has been the case heretofore. Contraction joints 1 inch deep x 5/16 inch wide run transversely every 12 feet. There are three longitudinal joints on the bottom of the canal, one on the center line, and one near each break point 10 feet from the center line. In addition, the slopes were built with longitudinal joints. The first is 12 feet from the toe of slope; the second is 12 feet from the first and is 14 feet from the top of slope. These joints were filled with a cold asphaltic joint filler as the pours were made.

The U. S. Bureau of Reclamation, in

an effort to get good work at lower cost, began on this job an innovation in alignment and grade. Formerly alignment and grade were checked quite carefully by instruments as the work progressed. The slip form operated in reference to a piano wire stretched along the grade. But that was discontinued.

On this job, Government surveyors set offset hubs for alignment and grade every 50 feet, and sometimes closer around the curves. Each stake was set 6 feet outside the canal line, with its top true to the elevation of the top of concrete. These stakes were used as a reference for placing the rails on which the equipment rode. The rails then served as an automatic guide for the heavy machines to follow, and

checking was quite casual from that point on.

Finished work is apparently equal in every respect to work formerly done with piano wire, and according to several of the engineers on the job, the Bureau has already been gratified to receive lower bid costs recently.

Canal Excavation

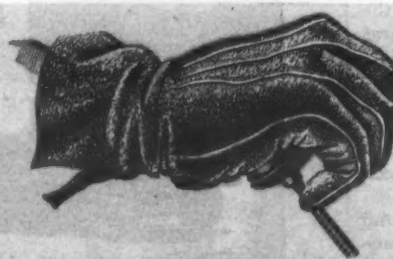
The Winston-Utah contract included excavation, canal lining, structures, and three large siphons. Most of the excavation and special forms for siphon construction were covered in a previous issue of this magazine. (See C. & E. M., (Continued on next page))

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Built for rugged and rough use, Model B is ready for all hauling jobs. As our heavy duty model, it has proven itself time and again. The all-welded frame is supported by 16" deep axle with Budd hubs and wheels. The superior construction and sound engineering in this model makes it the safest and most dependable trailer on the road.



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1060 East 11th Street, Oakland 8, California



Winston-Utah Rushes Big Reclamation Job

(Continued from preceding page)

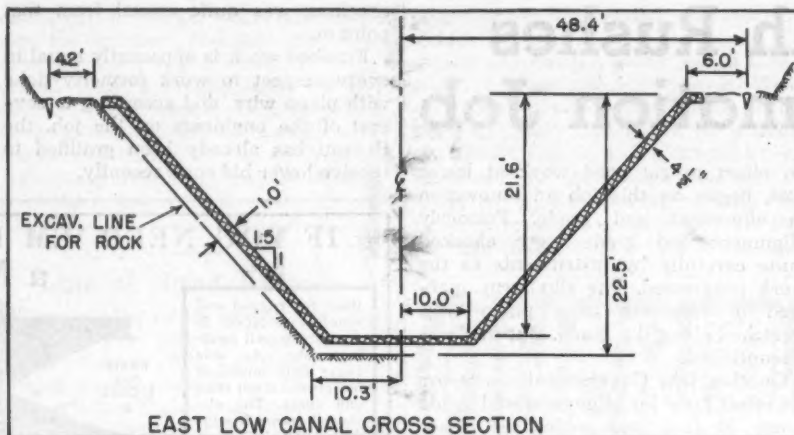
January, 1948, pg. 6.)

In the canal excavation, there were 1,711,062 cubic yards of common excavation and 901,785 cubic yards of rock. Details of how drilling and blasting equipment, a Marion 151-M dragline, a Marion 4161, a Bucyrus-Erie 54-B, and a fleet of D8's and Carryalls, did this work were carried in the previous article.

When the canal was dug at that time, the machines excavated it to a neat section and left the sides and bottom only a few tenths of a foot from grade. However, much of the terrain through which the canal ran was lava-rock country. The final result looked good, but underneath the smooth canal sides were large rock fragments, boulders, conglomerate, and other material which the trimmer could not remove without tearing itself to pieces.

Special equipment then had to be devised to cure that condition. First of all, the Bucyrus-Erie 54-B and the Marion 4161 electric dragline went back to the start of the job, one on each side of the canal. They excavated about 12 inches of material from the canal bottom and sides, casting it to the spoil piles left from the main canal excavation. This made room for earth backfill to go in—material which the trimmer could handle easily. Both machines made fine progress and had no difficulty at all keeping ahead of the lining machines.

Pipe lines were then run from elevated reservoirs and three wells in the project water-supply system, and lateraled out to sprinkler heads over a select, granular borrow pit. Earth in this pit contained some small rocks and some silt, sand, and clay; it was the best



available source of backfill material in the locality.

Two Caterpillar-D7-mounted Traxcavators of 2¼-cubic-yard capacity were then put to work in the pit to load a fleet of from 18 to 20 dump trucks. A smaller D4-mounted Traxcavator, carrying a 1-yard scoop, also was used. These machines loaded the damp dirt to the trucks, which hauled it to the canal. Two Wooldridge Terra Cobras were also used at night to lay the bottom material.

Access ramps for these machines had to be built at intervals of approximately 1,200 feet; they were dug out by dragline as the work caught up with each one.

The dirt was dumped in the bottom of the canal. Two Caterpillar D8 tractors with angling dozers then worked from the bottom to push the material about one-third of the way up the slope. Enough excess dirt was left piled to reach the top of the bank, once it could be spread.

A machine had to be devised for this purpose. It consisted of a special boom, fitted to a Lima ¾-yard Paymaster ma-

chine, on which a small skimmer scraper was mounted. Operated by the drag cable of the Lima machine, the small scraper bucket could be made to travel up to the top of the slope, distributing the dirt as it went. The machine traveled parallel to the banks and left

the dirt distributed evenly to the top.

A second special rig then had to be built to compact the material. It was made also by the Stockton, Calif., firm of Guntert & Zimmerman. Mounted on a small Northwest machine, it consisted of a latticework boom similar to the scraper. But this one carried a heavy-duty RPB compressed-air cylinder with a striking foot 3 feet wide. This shoe was soon widened to 6 feet.

A cable from the drag drum of this machine pulled the tamper from the bottom to the top of the bank, and as it made a pass, the Northwest machine then crawled ahead. The rig was used with a great deal of success. Density tests were good—up to 100 per cent—near the bottom of the slope, but they dropped to about 86 near the top of the bank.

After this machine had finished its work, the banks were sprinkled occasionally with a water hose to keep the material damp ahead of the trimmer.

With this line-up of equipment, about (Continued on next page)

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using a Rogers Model D-35-D and a Pole Type Trailer loaded with 80,000 lbs. of steel tank 67 feet in length. The conventional trailer mounts a fifth-wheel type of bolster which supports the front of the load and tows the pole trailer which carries the rear of the load.

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Moving this heavy Northwest power shovel from job to job presents no problem to the A. B. Burton Co. when they have their D-50-D Rogers semi-trailer to rely upon.

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C. & E. M. Photos
"Before and after" views of Winston-Utah's contract on East Low Canal. Above, the special trimmer follows the Lima-mounted skimmer which distributes dirt on the slope, and the Northwest-mounted tamper which prepares to compact the material. At right, the curing machine, groover, slip form, and trimmer leave a smooth section of concrete lining.

2,500 cubic yards of backfill was hauled in and placed in two shifts each day. Excessive undercutting when the work first started reduced the linear footage dangerously, and the machines were hard-pressed to stay out ahead of the trimmer and slip form. A slope engineer was then put out ahead with the draglines, and the machines took a lighter cut. When this was done the dirt would go farther, and the work stayed ahead of the lining much better.

Canal Trimming

A special canal-trimming machine, designed to remove excess dirt from the canal sides, was made for this job by Guntert & Zimmerman of Stockton, builder of heavy canal equipment for many years. The machine was built on a heavy steel frame and was designed for all-electric power. On this job, the power came in at 2,300 volts from a 13,200-volt transmission line Winston-Utah built along the canal.

The new trimmer consisted basically of two bucket trains, each carrying 11 trimming buckets with 3 teeth. Material brought up by these buckets then discharged to a conveyor system, which in turn passed off a long conveyor stacker to the road on top of the canal berm. Excess material scooped off by the trimmer on this job was chuted to the beds of dump trucks, which hauled it out ahead again to where the skimmer and tamper were working.

Each bucket line was driven by two 50-hp Fairbanks-Morse electric motors, which transmitted power through a gear-reduction box and a chain drive. The conveyor lines were driven by smaller 25-hp General Electric motors. Power was stepped down in voltage by a transformer bank installed on the machine.

The big trimmer rode along on special I-beam trucks about 18 inches deep, with Braden drive gears driving the four wheels under each truck. Blackhawk leveling jacks at each corner of the machine permitted easy adjustment up and down. But on this job, once the trimmer was set it was seldom changed.

Setting the rail track on which the trimmer and the rest of the equipment rode was no small task. A crew of about 20 men worked at this continuously. The rails came in 33-foot sections. They were hauled to location by a flat-bed trailer drawn by the Lorain

truck crane which handled the sections. The rail sections were set to the line and grade established previously by surveyors.

Four men working with Chicago Pneumatic air spades managed to stay up with tamping. It was quite important, of course, to tamp material well

under the short ties, to give the track the necessary stability when 100-ton machines passed by.

(Continued on next page)



Both ends are put to use! An 84" Dozer Blade at one end... a One Yard Scoop at the opposite end. Driver sits crossways with excellent visibility and perfect control. Track tilts and top section folds down hydraulically (for low overhead clearance)... without sacrificing Scoop or Dozer action.

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Sumter, S. C., Industrial Equipment Co. of S. C.
Tampa, Fla., Chapman Machinery Co.
Utica, N. Y., Credle Equip. Inc.
Yakima, Wash., Intervall Equipment Co.

Winston-Utah Rushes Big Reclamation Job

(Continued from preceding page)

Canal Slip-Form Liner

The slip-form liner, which worked so well, was also built for the job by Guntert & Zimmerman. It was capable of rather easy adjustment to line a canal with bottom widths of 12, 20, and 38 feet.

This machine also had all-electric power, with a transformer bank to step the power down. It had the same Braden-drive trucks and Blackhawk leveling jacks as equipped the trimmer. Concrete entered the slip form through a deck hopper, fed by pavers. The concrete then passed to a traveling bucket operated electrically from an operator's cage. This machine traveled across the full distance of the slip form, dropping concrete to a slotted opening across the machine just below the traveling hopper.

Twenty elephant trunks led from this opening down to the base of the machine, where the concrete was distributed to various pockets. Special internal and external vibrators, designed by the manufacturer of the machine, vibrated the concrete as the slip form moved forward.

On this machine there were several innovations. First of all, the operator of the machine sat in a cab on the back end of the rig where he could watch the texture of concrete as his machine moved along. This permitted him to adjust vibration to produce excellent concrete. Secondly, about 22 tons of counterbalance weights were placed on the bottom of the 90-ton machine, and it never showed the usual tendency to rise up when the vibrators were turned on. It was so stable that the wheels never even slipped as it moved along.

The slip form was limited, however, to a 20-degree curve. Most of the curves on the job were less than this, but one tough spot, where a 40-degree curve was found, had to be lined by hand methods.

Another innovation was the use of fixed knives to cut the longitudinal joints. These knives, consisting of double sets of steel bars, were bolted to the underside of the slip form. Since they always remained in one spot, the finished joints formed a straight line.

The slip-form operator controlled only the travel and concrete vibration.



C. & E. M. Photo

Looking down from the head block at the batch plant Winston-Utah set up for its East Low Canal job, we see the conveyor belt which fed the plant.

Control of the concrete dump was the responsibility of the operator of the traveling hopper. If any of the pockets ran short of material, the man could then signal the operator of the slip form

to slow down or stop until he could catch up.

The slip form got its concrete from two Ransome 34-E pavers working on the berm above the canal. These ma-

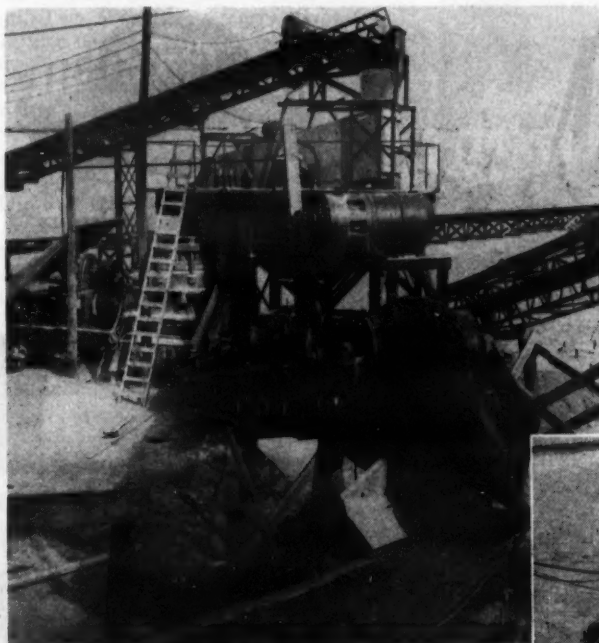
chines took dry batches from the batch trucks, mixed them with water from a near-by pipe line, and discharged the concrete to the deck hopper aboard the slip form.

Operation of the slip form was so smooth and trouble-free that its output could easily be boosted to a mile per week. Earth backfill was the controlling factor, however. The only time the slip form was down was one morning when one of the vibrators burned out. A mechanic replaced the unit in about 30 minutes.

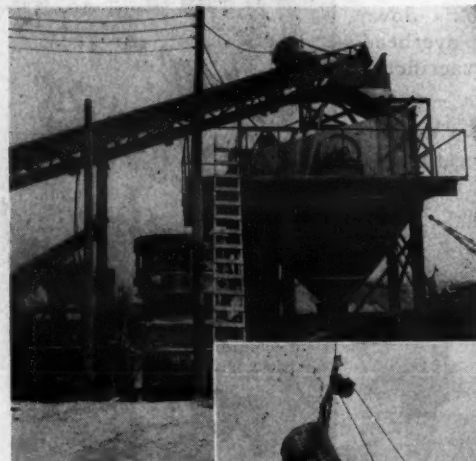
As the slip form rode along, it left the concrete surface relatively smooth. Ten finishers, working from platforms on the slip form, installed wood strips in the longitudinal contraction joints, and also put the initial steel-trowel finish on the fresh concrete. Four men worked on each side, and two on the bottom.

Finishing Concrete

Behind the slip form, usually at a distance of about 30 feet, came another (Concluded on next page)



Foley Brothers like the capacity and dependability of their TelSmith Portable Plant.



The No. 48 TelSmith Standard Gyrasphere Crusher in closed circuit with 5' x 12' TelSmith 3-deck Pulsator, make up this portable plant's crushing-screening unit.



The portable feeder-hopper unit has a 36" x 6' TelSmith Heavy-Duty Plate Feeder.

every 15 minutes...
A 50-yd. CAR OF BALLAST!



AT FOLEY BROTHERS' TELSMITH Portable CRUSHING-SCREENING PLANT

• Turning out ballast for the C & NW Ry.—that's minus 1 1/4" sand and gravel with oversize crushed and some sand eliminated—this TelSmith Portable Crushing-Screening-Loading Plant of Foley Brothers, near Algonquin, Ill., has a capacity of 2000 cu. yds. per 9 1/2 hrs. They load a 50-yd. car in 15 minutes. The No. 48 TelSmith Standard Gyrasphere Crusher in closed circuit with a 5' x 12' TelSmith 3-deck Pulsator, and a 30" x 70' TelSmith steel truss Conveyor give the plant a compact, mass crushing-screening unit of maximum capacity. Dependable, even flow is provided by the portable hopper-feeder unit with its 36" x 6' TelSmith Heavy-Duty Plate Feeder. Find out about TelSmith Portables with Gyrasphere Crushers in Bulletin P-34.

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EMBURY MFG. CO., WARSAW, N. Y.



rail-mounted machine called a groover. It carried a full-length steel knife which cut the transverse contraction joints. The knife was sunk in the concrete by the combined force of compressed air and vibration.

Transverse joints were cut on 12-foot centers. As this machine moved along, five finishers removed the wood strips placed previously behind the slip form, and finished the grooves with small-radius edgers.

A subcontract was let to the Charles R. Watts Co. of Seattle to apply joint material and concrete-curing solution. This material was also applied from a special bridge which was rail-mounted and traveled under its own power.

A cold joint filler was made up by mixing Enamelite powdered asphalt and asbestos with Enamelite mixing oil. Four guns on the front side of the machine were used, with compressed-air hose to force the sticky black material out the nozzle. The 1-inch-deep grooves were filled level with the material. As the guns were emptied, they were laid on deck, and the four men picked up refilled spares. Two men on deck mixed the material and filled the guns.

The concrete was then cured by spraying white-pigmented Hunt Process concrete-curing solution over the canal at the rate of a gallon to 150 square feet. After this machine had made its last pass, the canal was finished except for backfill and dressing on a minor scale. The concrete curb at the top of the canal berm was cured by spraying Hunt Process through small orchard-type sprayers.

Batch-Plant Set-Up

The same batch-plant set-up as was featured in last year's article on siphon-barrel work (see C. & E. M., January, 1948, pg. 6) was used for canal lining. Located approximately 6 miles east of Soap Lake near the main highway, the plant was about 11.5 miles from the farthest point on the canal.

It consisted of a 4-compartment Johnson batch hopper, two Noble bulk-cement silos of 750-barrel capacity each and one 1,000-barrel hopper, two Butler Carscoops for unloading bulk cement, and a charging tunnel. Sand and aggregates were produced under a separate USBR contract with H. F. Green & Co. of Spokane, and they were then delivered by truck to the four 25-yard compartments over the tunnel.

Gates tapped the tunnel, and a long conveyor run moved the material up to the top of the plant. A turn swivel at that point routed the material to the proper bin. This arrangement was added after last year's work, to boost the capacity of the plant.

A small contract was also sublet to Oilfields Trucking Co. of Bakersfield, Calif., to haul dry batches. This firm put 15 large White and Kenworth trucks on the job, each machine capable of hauling six 1.4-yard batches.

The batches were mixed according to the following formula:

Sand	1,600 lbs.
Rock, 3/4-inch maximum	596 lbs.
Rock, 1/2-inch maximum	894 lbs.
Rock, 1/4-inch maximum	1,491 lbs.
Cement	751 lbs.
Vinyl resin	344 c.c.
Water	300 lbs.

The batch plant operated two shifts per day, usually putting out concrete canal lining during the day and then switching to siphon pours on the swing shift. Siphon work, incidentally, speeded up so that a pour was made every day.

At Crab Creek siphon, however, a stream which has been dry during the summer for nearly a century had a good flow last season. Many of the canal sections had ground water, also, which had to be dried out with pumps. Some sections in the worst places rest on a gravel drain base, with weep holes leading through the slab.

Despite ground water, a tough winter, rain, hard rock, and a host of other natural obstacles, the job proceeded ahead of schedule. It is one of the im-

portant links of the big distribution system which eventually will carry Columbia River water many miles southward through a prehistoric water-course.

Personnel

The job was designed and supervised under the direction of L. N. McClellan, Chief Engineer of the Bureau of Reclamation, with H. A. Parker as Supervising Engineer and F. S. Arnold as Resident Engineer.

For Winston-Utah, the job was done under the supervision of Project Manager George M. Mann, assisted by Roy Harer, General Superintendent. Other superintendents on the job were Al Costner, concrete trimming and lining; Ivan "Spike" Vinson, slip form; Pierre Wambold, siphons; Al Lee, structures; Ted McDaniels, blasting; Oscar Hahn, electrical; and W. A. Elmquist, batch plant. Jim Barton was Master Mechanic; Ray Wahl, Office Manager; Henry Parker, Field Engineer; and Bill Sell, Office Engineer.

HOT or COLD Mix Asphalt

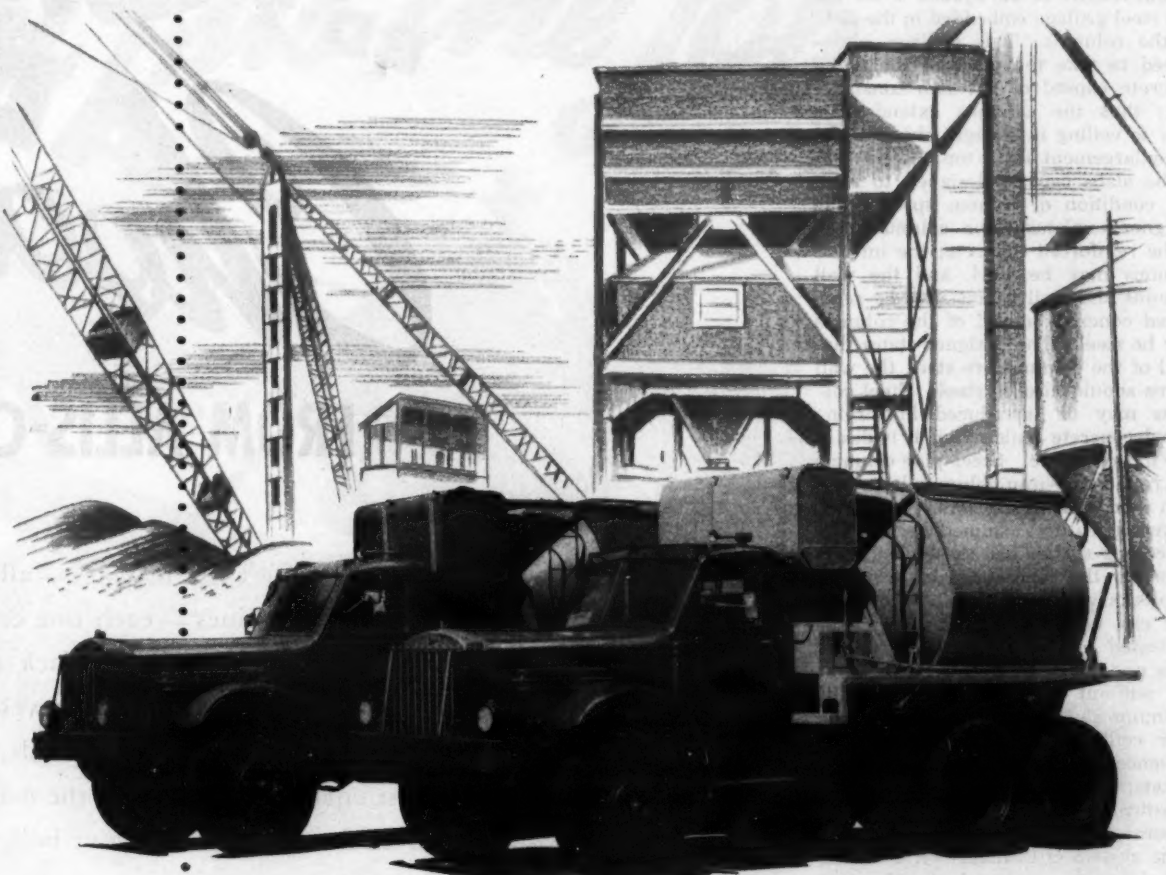
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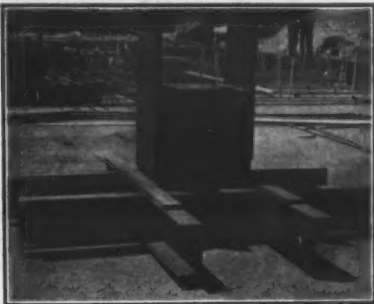
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Construction view of the Smooth Ceilings System of floor construction, showing the slab form in place, the steel grillage attached to the steel columns, and reinforcing steel partly in place for the slab.

Flat-Slab Ceilings With No Projections

A method of floor and ceiling construction which eliminates projecting beams, flared column caps, and other irregularities is announced by the Smooth Ceilings System, Metropolitan Life Bldg., Minneapolis 1, Minn. Essential feature of the system is the use of a steel grillage embedded in the slabs at the columns. This grillage is designed to take the place of the flared concrete capital of flat-slab construction; thus the columns extend from floor to ceiling in straight shafts without enlargement at the top.

The slabs can be designed to meet any condition of column spacing, the designer explains. The columns may all be reinforced concrete; the interior columns may be steel, and the wall columns and wall beams may be reinforced concrete; or all of the columns may be steel. The designer states that if all of the columns are steel, the wall beams should also be steel. Steel columns may be introduced into reinforced-concrete buildings if it is desirable to save space. Steel-pipe columns and round cast-iron columns have also been used with this system.

Among features claimed for the all-flat ceiling system are these: since the forms for the concrete slabs are plain flat decks with holes for the columns, they can be handled easily and prefabricated to size; the system permits pipes and ducts for utilities to run at will without interference; it permits minimum story heights for any given clear ceiling height; it permits free movement of air without dead-air pockets; it is especially suitable for acoustical treatment; and it increases economy of construction.

The system is available on a license basis from the designer. Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 128.

Heavy Impact Tool

A new and heavier model of the I-R impact tool is announced by the Ingersoll-Rand Co. of Phillipsburg, N. J. The new model, Size 8U, is designed to remove nuts of up to 5/8-inch thread size, to drive and remove studs, to extract broken cap screws and studs, to apply and remove machine screws of all kinds, to run wire brushes, to tap and ream, and to drill steel, brick, and masonry. It is also recommended by the company for wood-boring operations.

The 8U has a reversible electric motor which will not burn out, says the company, even if the spindle should stall completely. According to the manufacturer, the impact principle operates automatically whenever resistance is met, providing extra power to push the job through, and practically no torque reaction is transmitted to the operator under any condition. The 8U is 12 1/2 inches long, weighs 9 pounds, and is available for operation on 110 or 220-volt ac or dc circuits.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 56.

Shovel Cranes Available On Wheel, Crawler Base

Crawler-mounted and truck-mounted shovel cranes are the subjects of two catalogs issued by the Link-Belt Speeder Corp., Division of Link-Belt Corp., 1201 Sixth St., S. W., Cedar Rapids, Iowa. Bulletin No. 2335 describes the truck-mounted Model HC-70 shovel crane; Bulletin No. 2259 describes the crawler-mounted Models K-360 and K-365 shovel cranes.

The bulletin on the K-360 and K-365 emphasizes the Speed-O-Matic hydraulic pressure control designed to provide smoother and easier control

with a subsequent reduction in operator fatigue. It describes also the lower-frame assembly of the units, the positive chain crowd, the boom-hoist mechanism, the safety-type independent boom hoist, and other features. Ranges and capacities are listed for each model when used as a shovel, as a dragline, or as a crane and clamshell.

Construction features of the HC-70 described in Bulletin No. 2335 include the upper machinery unit, the front-drum assembly, the hoist-drum and boom-hoist assembly, the swing-clutch shaft assembly, the walking-beam support for the rear axles, and the rear outrigger assembly. The bulletin also

contains information on clearances, capacities, and working ranges of the HC-70 when equipped with a 30, 40, 50, 60, 70, or 80-foot-long boom.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For Bulletin No. 2335, circle No. 123; for Bulletin No. 2259, circle No. 124.

Macwhyte Rep. in West

H. S. Dersheimer is the Direct Factory Representative for Macwhyte Co. wire rope in Oklahoma and parts of Arkansas, Kansas, and Wyoming. He will make his headquarters in Tulsa.

W-SPEED PATROL BD-3

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AD-4
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FOUR DIESEL-POWERED MODELS—all full-fledged construction machines—each one easily handles ditching, sloping, scarifying, black-top mixing, snowplowing, sod removal...as well as maintenance. Differences in weight, speeds, horsepower and cost enable you to match the machine to the job to be done...and to your budget.

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Illinois Road Conference

The 35th Illinois Annual Conference on Highway Engineering was held March 1-3 at the University of Illinois. The conference is sponsored by the Illinois Association of County Superintendents of Highways, the Illinois Division of Highways, and the Department of Civil Engineering of the University, with the cooperation of the University Extension Division. Its purpose is to bring together highway-minded people to discuss current trends in highway engineering problems, and to gain an overall picture of highway transportation needs and means to satisfy them.

The speakers who were selected to present the various subjects represented Missouri, Illinois, Indiana, Michigan, Ohio, and Washington, D. C. The conference ran for three days. About 300 attended.

Textbooks on Engineering

New editions of three books on engineering and engineering design have been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. One is the 22nd edition of "Field Engineering" by Searles, Ives, and Kissam—a two-volume handbook of the theory and practice of railway sur-

veying, location, and construction. Another is the 3rd edition of "Design of Steel Buildings" by Hauf and Pfisterer. And the third is the 3rd edition of "Elementary Structural Problems in Steel and Timber" by Young and Morrison.

Each of these books features drawings, diagrams, charts, complete mathematical tables, and specification charts as a supplement to the text.

"Field Engineering", Volume I, is 414 pages long, has 195 illustrations, and sells for \$3.75. Volume II contains 422 pages of mathematical and surveying tables, and sells for \$3.75. Both volumes are published in a combined edition at \$6.50.

"Design of Steel Buildings" is 275 pages long and sells for \$5.00. "Elementary Structural Problems in Steel and Timber" is 329 pages long and sells for \$4.50.

Stoothoff Joins Reed Co.

The appointment of B. O. Stoothoff as Special Representative is announced by the Cleco Division of the Reed Roller Bit Co. Mr. Stoothoff will act as liaison man between the General Sales Office in Houston, Texas, and local dealers in the Cincinnati, Ohio, area. His office will be located at 431 Temple Bar Bldg., Cincinnati.

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- A strong, shock-absorbing tubular frame that also protects control rods inside frame.
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- A full circle revolving blade that allows grading forward or in reverse.
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3



Road Builders Hold Three-Day Meeting

Needles Elected President Of ARBA at 46th Annual Conference in Washington; Future Plans Outlined

THE American Road Builders' Association elected Colonel Enoch R. Needles President at its 46th annual meeting and conference in Washington, D.C., on February 7, 8, and 9. Needles is a member of the firm of Howard, Needles, Tammen & Bergendoff, consulting engineers of New York City. As the new ARBA head, he revealed that the future plans of this "good roads" organization include the following three points: (1) a more vigorous program of technical activities, (2) an expansion of its work in public relations, and (3) extension of its educational program among students at engineering schools.

Approximately 1,200 attended the convention sessions, which were shuttled about in the public rooms of the Mayflower, Statler, and Willard Hotels. The three-day conference included meetings of the various technical committees; the presentation and discussion of papers relating to highways and airports by experts in these fields; and addresses by various Federal government officials at the general sessions, annual banquet, and daily luncheons. The visitors to Washington were favored with unusually mild weather for February; a balmy 68 degrees prevailed on the last day of the meeting.

The program had something of interest for each of the four main sections comprising the ARBA: (1) equipment manufacturers and distributors; (2) contractors and builders; (3) the public servants and administrators in the Federal, state, county, and city service, and also in the national and state legislative bodies; and (4) engineers and educators who are interested in the planning, design, construction, supervision, and maintenance of highways and airports.

General Conference Sessions

Presiding at the opening general conference session, Charles M. Upham, Engineer-Director of ARBA, struck the theme of the convention by emphasizing the need to build as many roads as possible, as economically as possible. The highway program must be accelerated, he said, since even though 38,000 to 40,000 miles of roads are now being built each year, the older roads are failing at that very same rate. Upham also stressed the increase in over-the-road truck hauling since the war.

Thomas H. MacDonald, Commissioner of Public Roads, said "we are overloading our highways in their traffic-volume capacity and in their structural capacity. The overloading . . . by numbers and by driver misuse is reflected in the accident record. The overloading of safe structural capacity is reflected in the skyrocketing maintenance and reconstruction costs."

The Commissioner expressed concern over bills before several state legislatures authorizing axle loads heavier than the 18,000-pound limit recommended by the American Association of State Highway Officials. And he observed that the chief destructive factor in highway failures is overloading far beyond the legal limits. According to MacDonald, axle loads of 31,820 pounds have been found in New York, and as much as 40,420 pounds in the state of New Jersey.

Truck operators claim that prevention of damage to bituminous pavements, and the pumping and breaking of concrete, are technical matters for which engineers must find and apply a remedy. MacDonald admitted this, but

he also asserted that excessive wheel-load concentration can be materially reduced by vehicle design. He cited as an example the fact that the typical vehicle used for heavy hauling in the east has three axles, as compared with five in western states. "The western vehicle", MacDonald observed, "has a gross weight 35 per cent heavier than the eastern vehicle, but the average heavy axle load of the western vehicle is 30 per cent below that of the eastern vehicle."

MacDonald wistfully expressed the hope that the insignia I.P.S.—In the Public Service—will come into use to carry merited recognition. He reflected that "in England, for generations, H.M.S.—His Majesty's Service—has ranked high as a passport, and as a command to all loyal subjects to render

any assistance possible to the one wearing this symbol of responsibility."

The retiring President of ARBA, J. T. Callaway of the Goodyear Tire & Rubber Co., stated that there is an emergency in our highway situation, and that the old roads, widened and surfaced, or the new roads built, fall far short of meeting the nation's vital needs, despite the fact that in 1948 the dollar volume of Federal-Aid work rose to

nearly \$800,000,000. This was a new record far exceeding any previous year, and the total of Federal and non-Federal work was over twice that amount. But, Callaway observed, "We face a total registration of approximately 40,000,000 motor vehicles on our highways. Our highway system of today was not designed to accommodate this registration."

(Continued on next page)

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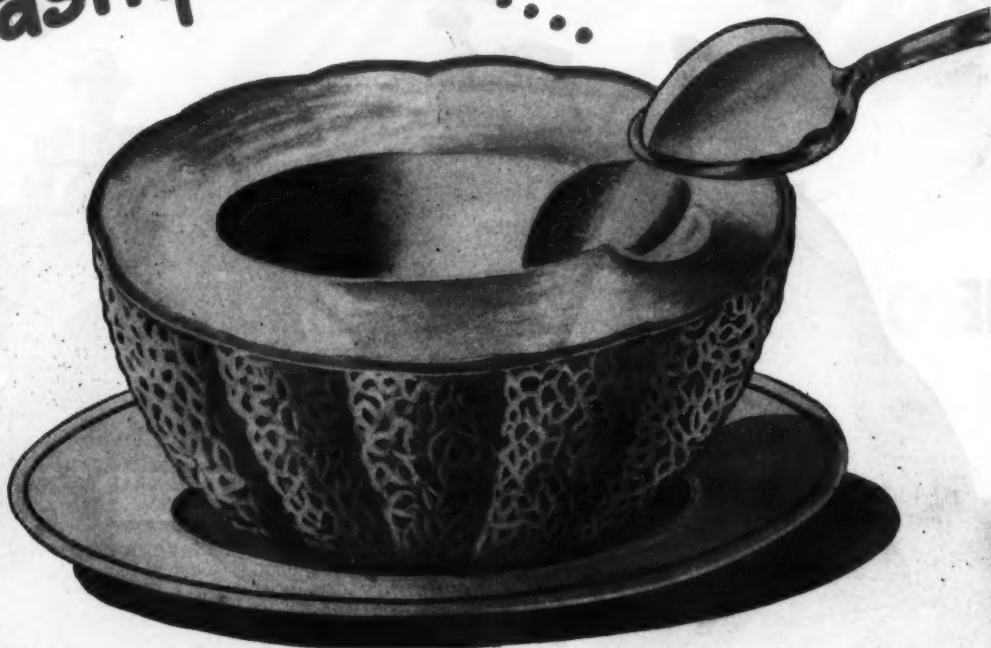
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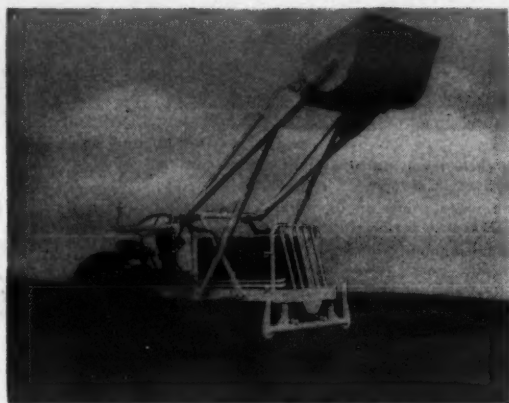
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Urban Problems

Urban highway problems were discussed in a paper presented by Joseph Barnett, Chief of the Urban Road Division of the Public Roads Administration. Barnett urged the vigorous prosecution of a five-point program to meet the increasing congestion on highways. This program, he declared, should include: (1) the improvement of the arterial route system, (2) the betterment of distributor streets, (3) the improvement of the transit system, (4) the solution of the terminal problem, and (5) more efficient use of present facilities.

Minnesota's new Democratic Senator Hubert H. Humphrey, in addressing the Municipal Division, urged more funds for urban highways and streets, and stated that financing of such needed construction was a matter for joint state and municipal consideration. "Local municipal streets," the Senator asserted, "carry anywhere from 20 to 50 per cent of total automobile traffic, and a fair division of highway-user taxes means that 20 to 50 per cent should go for construction and maintenance of local municipal streets."

Senator Humphrey also observed that the Federal-Aid program is unhappily thwarted when the municipalities cannot raise the funds necessary to match the Federal-Aid funds. In order to make the Federal-Aid program successful, the first step must be a joint effort on the part of state and local authorities to arrive at an equitable distribution of revenues coming from within the state, he declared. "Then, the increasing problem of traffic congestion in urban areas," the Senator continued, "must be met by earmarking a larger percentage of Federal aid to municipalities. The two programs must be undertaken together or both will fail."

Secondary Roads

That same day the ARBA was addressed by another member of Congress, J. Harry McGregor, Republican Representative from Ohio's seventeenth district. But he urged that highway money go in a different direction—away from the urban centers and to the secondary roads out in the country. McGregor called attention to the fact that of the 3,300,000 miles of roads, alleys, and streets in our nation, 3,000,000 miles are in rural districts. Of these, 23 per cent are graded and drained but not surfaced, and 31 per cent are primitive undrained and not surfaced. Over these farm-to-market roads 4,000,000 children ride to school daily; 33,000 rural letter carriers travel approximately 1,500,000 miles a day, serving 30,000,000 people.

He suggested the need of a complete reorganization of those branches of Federal and state highway departments that have control of the road program dealing with farm-to-market roads—county and township roads. McGregor challenged, "Why not establish, Federal and state, a division to handle farm-to-market roads, county and township—a division to cooperate with the county and township organizations, and to delegate to the county and township officials as much responsibility for planning, engineering, and construction as they are organized and equipped to undertake."

"The creation of this division will give to the local people an opportunity to put



At the ARBA 46th annual meeting, retiring President J. T. Callaway (left center) shakes hands with incoming President Col. Enoch R. Needles. Left to right of them are Charles W. Smith, Vice President, Southern District of the ARBA; Charles M. Upham, Engineer-Director; and Paul B. Reinhold, Vice President, Northeastern District.

some practical knowledge into our road program. They will know local problems, needs, and conditions, and then we can truly design and build a road to fit the traffic which it bears. Give to rural America, the farmer, the shop worker, the mailman, and the school-

bus driver, an opportunity to get to and from their work twelve months out of the year. We want and certainly are entitled to an all-weather road."

Federal Aid for Highways

Representative Will M. Whittington,

Democrat, of Mississippi, and Chairman of the Public Works Committee, spoke at the annual banquet on "the next steps in Federal aid for highways". He stated that the Federal-Aid Highway Act of 1948 authorizes \$450,000,000 for each of the fiscal years 1950 and 1951. To safeguard improvements and expenditures, the Act allows two years for matching. The distribution as between Federal-Aid highways, secondary and feeder roads, and urban roads is the same as the Act of 1944. All the other features of the 1944 Act remain in full force and effect, the Congressman asserted.

Democratic Senator Dennis Chavez, of New Mexico, in addressing the Pan American Division of ARBA, revealed that Dr. Axel Wenner-Gren, Swedish industrial tycoon, had been invited to tell the Public Works Committee of the Senate his views on the construction of highways in Latin America. It is Wenner-Gren's thought, according to the Senator, that private capital associated with international banking institutions

(Continued on next page)

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Road Builders Hold Three-Day Meeting

(Continued from preceding page)

should finance and promote the organization of regional corporations for the construction of international highways and other communication media.

"Dr. Wenner-Gren envisions a corporate structure like the Triborough Bridge Authority," said the Senator. "In other words, just as neighboring states can get together and organize semi-governmental institutions for the construction of bridges and highways, nations in the western hemisphere can do likewise. Neighboring countries can organize authorities on a strictly sound banking basis and build highways which we so badly need."

Major General Philip B. Fleming, Federal Works Administrator, speaking at one of the luncheon meetings, stressed the need for the improvement of main thoroughfares to speed up the flow of traffic on city streets. He tied in travel congestion with the retarded development of housing, and pointed out that crowded living conditions seriously restrict traffic reforms. "Sufficient land in slum areas and blighted sections can be acquired in the initial taking," the General concluded, "not only for highways but for general redevelopment of the area. Later, as funds become available, work can be started on individual projects."

Technical Papers

A variety of technical papers were presented and discussed at several sessions, lending a proper balance to the more general talks on policy or administrative problems. Road building was taken up in all its many phases from foundations and soils to pavements and their maintenance. The same thorough treatment was accorded to airports in other sessions.

A comparatively new subject, pre-stressed-concrete runways, was thoroughly explored in a paper presented by L. Coff, New York City consulting engineer. Coff pointed out that while the initial cost of construction of this type of runway would be comparatively higher than the conventional type, such a pavement would last longer and require practically no maintenance. One of the uses to which such runways would be well suited, Coff explained, would be in the construction of heated runways for defense airports in Arctic regions. Pre-stressed concrete would withstand stresses from the heating units employed to keep the runways free from snow and ice.

Two members of the faculty of George Washington University, Washington, D.C., analyzed engineering education with respect to road building. Dr. Bruce D. Greenshields, Professor of Civil Engineering, stated that in order to have better highways we must have better engineers, better colleges, and better teachers. But lack of good teachers and engineers in the highway construction field can be traced to inadequate salaries for both. "A recent check of two universities with which I am familiar",

he said, "shows that the average instructor in civil engineering spends 60 hours a week at his work. For this work he may and often does receive a smaller salary than, for example, a government stenographer."

Doctor Greenshields injected a note

of caution with regard to Federal aid to hard-pressed private colleges, and affirmed that it would be better to deny the gift of Federal aid than to let private colleges become politically controlled.

Carl H. Walther, Assistant Dean of

Engineering at George Washington University, presented a scholarly paper entitled "Is Our Engineering Education Too Materialistic?". He scored the student who could not see the use of taking any but engineering courses "because (Concluded on next page)

6 Profit-Makers in One Machine

The 1/3 Yard Schield Bantam is designed for rapid conversion from shovel to trench hoe, dragline, clam, pile-driver, or crane. It's a time-saving money-maker on a wide variety of jobs all year around. Mounts on any 1 1/2-ton truck chassis — drives up to the job and digs in.

High strength alloy construction throughout with big machine features that mean longer life, freedom from expensive breakdowns, and ease and economy of operation . . . all major assemblies roll on ball bearings . . . modern hook roller design . . . bull gear protected from dirt and grit . . . smooth operating mechanical clutches . . . full circle design . . . fast cycle operation.

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106 and 107

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they're not practical". The professor also criticized "the graduate of several years' standing who is too busy to give some time to service in his professional society, since he 'doesn't get anything out of it'. And so on. These folks will eventually get to where they now want to go; they will reach their goals, and when they do they will wonder why they are bored and unhappy."

Professor Walther suggested the need for more people thinking in the broad field of human relationships—not just politics or economics or engineering professional status, but the relation of a man to other men and the true nature of his relation to himself. In conclusion he urged, "Let us therefore feel and speak out against a blind worship of materialistic techniques. Let us restate our faith in those elementary human virtues of industry and honesty, of tolerance and charity, and dedication to service."

ARBA Future

In the final address of the conference, the newly elected President, 60-year-old Colonel Enoch R. Needles, reviewed briefly the history of the Association and its identification with the development of the modern highway. With regard to future ARBA activities, Colonel Needles revealed that two new key men would be added to the headquarters staff. One of these men would devote his attention to the technical activities of the Association, while the other would concentrate on public relations. The latter would be directed to legislators and to the public, as well as to members of the Association itself.

The new President promised to put more emphasis on the work of the Educational Division, and suggested that teams of visiting lecturers make trips to all engineering schools. A team of four men—a public officer, an engineer, a contractor, and a manufacturer—would each tell the students his part of the story of engineering and construction. Slides and sound film would be used, if available, to illustrate construction jobs and equipment manufacture and performance.

Colonel Needles also suggested full cooperation with all other engineering and construction groups with interests common to those of the ARBA. He pointed out that paid secretaries and administrators of these groups "appear to be thinking in terms of rivalry rather than cooperation". As an example of this lack of cooperation, Needles cited four different kinds of student chapters in civil-engineering colleges—civil engineering, contracting, road building, and prospective highway officials. He urged that the four national societies and associations involved get together quickly and work through one student chapter in each college or university. "We might call it the 'Joint Engineering Societies Student Chapter', or by a name of similar import," Needles suggested. "Then each of our national groups of senior engineers, constructors, and manufacturers could carry their individual messages to those student groups without confusion."

New Officers

In addition to choosing Colonel Enoch R. Needles as its President, the American Road Builders' Association elected a full complement of other officers.

The four regional Vice Presidents were elected to succeed themselves. They are Paul B. Reinhold, President, Atlas Equipment Co., Pittsburgh, Pa., for the Northeastern District; Charles W. Smith, President, Smith Engineering & Construction Co., Pensacola, Fla., for the Southern District; W. A. Roberts, Executive Vice President, Allis-Chalmers Mfg. Co., Milwaukee, Wis., for the Central District; and T. E. Stanton, Materials and Research Engineer, California Department of Public Works, Sacramento, Calif., for the Western District. Jennings Randolph, Assistant to the

President of Capital Air Lines, Washington, D. C., was elected Treasurer to succeed the late Captain Herbert C. Whitehurst. He was also re-elected President of the Airport Division.

Elected to three-year terms on the ARBA Board of Directors were: Paul L. Andrews, Executive Secretary, Georgia Highway Contractors Association, Atlanta, Ga.; Robert B. Brooks, consulting engineer, St. Louis, Mo.; Bernard Gray, General Manager, The Asphalt Institute, New York City; Robert N. Rein-dollar, Chairman, Maryland State Roads Commission, Baltimore, Md.; Paul B. Rynning, Jackson County Highway Engineer, Medford, Oreg.; Charles H. Sells, consulting engineer, Albany, N. Y.; and A. R. Taylor, consulting engineer, Koppers Co., Pittsburgh, Pa.

Other division presidents, in addition to Mr. Randolph, are as follows. Nello L. Teer, Jr., Vice President of the Nello L. Teer Co. of Durham, N. C., was elected President of the Contractors Division. Alan N. Buck, Superintendent of Highways of Macon County,

Decatur, Ill., was elected President of the County Highway Officials Division. H. H. Kranz, City Engineer, Cincinnati, Ohio, was elected President of the

Municipal Division. And the Manufacturers Division elected R. K. Stiles, Executive Vice President of the Austin-Western Co., Aurora, Ill., President.



JONNUM'S EVER READY RIPPER

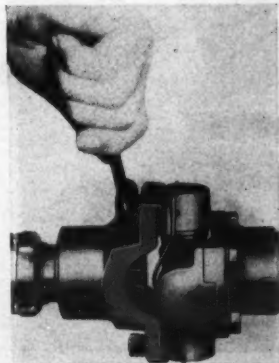
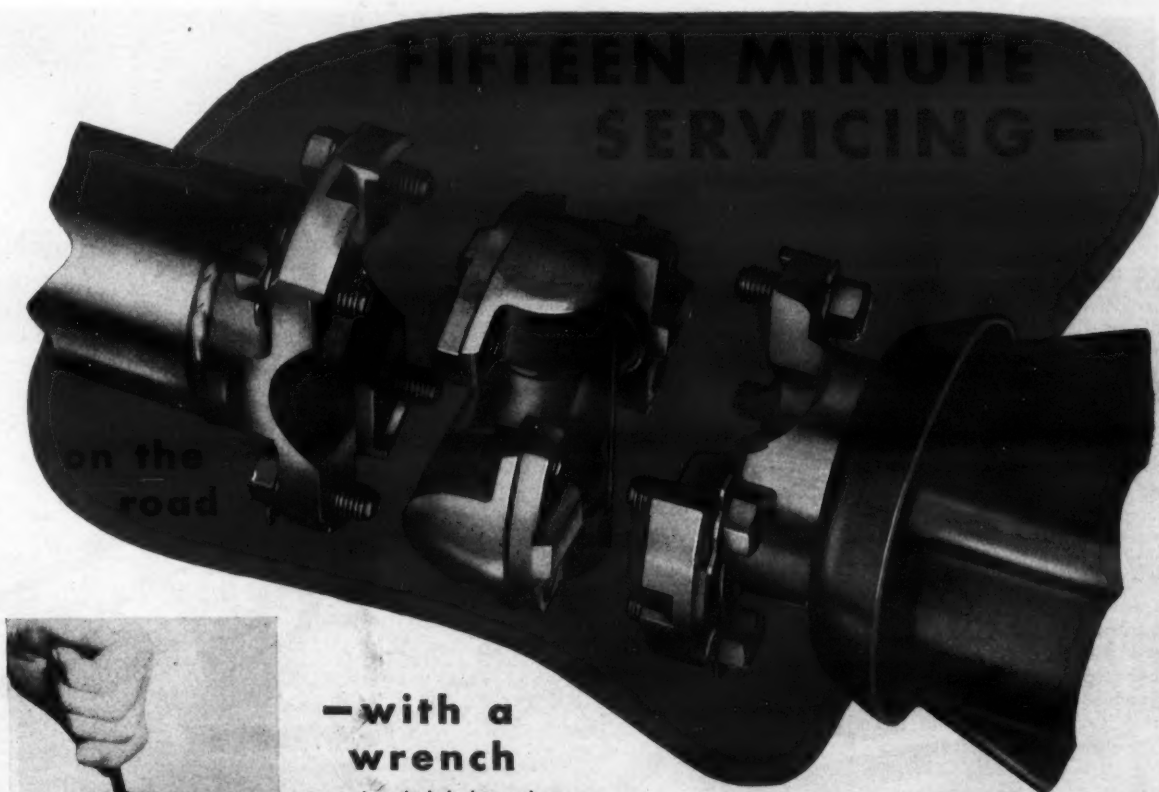
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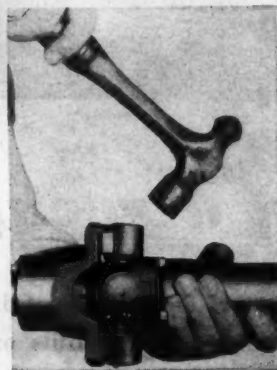
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to turn down the lock plates and remove the bolts—and to tighten and lock them again.



**—and a
hammer**

to tap the tops of the bearings lightly, to release them—and to compress the cork packing between the bearings and trunnions when the joint is re-assembled.

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Dump Trailer, Chassis Are Custom-Designed

Hydraulic dump trailers are available in custom-built styles from Omaha Standard, 2411 W. Broadway, Council Bluffs, Iowa. These heavy-duty units are designed to withstand the rugged use encountered in off-highway work. The trailer chassis can be equipped with several styles of bodies to meet the various requirements of the user, the manufacturer states. The chassis is available with single or tandem axles. Dual wheels are standard.

The Omaha trailers are equipped with Perfection hoists designed to handle the load requirements of the body. Among the features claimed for the hoist are a free-rolling cam action, high mechanical advantage, elimination of all possibility of jackknifing, protected mechanism, and a hydraulic pump said to develop a pressure of 1,800 psi.

Among the features claimed for the chassis and body are heavy-duty steel



The Omaha Standard hydraulic dump trailer is designed for use in rugged off-highway work.

construction, distributed load, conventional fifth wheel, complete unit design, heavy-duty axle, heavy-duty springs, and Bendix Westinghouse air brakes with Bendix and Midland vacuum brakes available as optional equipment. Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 54.

Lightweight Vibrator

A catalog describing the Mighty Midget concrete vibrator is available from the Mall Tool Co., 7743 S. Chicago Ave., Chicago 19, Ill. This vibrator, discontinued during the war, is again back in production. It has an overall length of 46 inches and a weight of 27 pounds.

The catalog contains five photographs showing the Mighty Midget in use on a variety of concrete-vibrating jobs. It describes its principal features and also lists its specifications. Among the features claimed for this vibrator are the electric-motor power unit, the loop handle with built-in switch, the patented vibrator head, Mall-built shaft, and others. The last page of Catalog No. 808 is devoted to a brief description of other vibrators in the Mall line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.



Smooth going on a rocky road

It takes a shovel with rugged dependability to make profitable headway on a rock cut like this. That's why the machine on the job is a Bucyrus-Erie 54-B, for the 2½-yd. 54-B combines big-shovel strength, power and durability with small-shovel speed and efficiency. The result is more passes per shift,

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Easiest handling for their capacity. MM Industrial Wheelers are quick and easy to maneuver.

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Highway Doctoring In the Sand Hills

**Tricky Soils, Low Budget
Complicate Repair Work
On Much-Traveled Roads
In Western Nebraska**

IN the western Nebraska city of North Platte, a highway maintenance engineer named L. W. Fisk frequently shows up at his headquarters to see his maintenance crews get started for the day. By 8:15 they are all gone. Fisk can then jump in his Ford, travel 60 miles, and be in the town of Ogallala in time to repeat the performance.

The explanation of this is not that the Ogallala men always show up late for work. The big highway district of which Fisk is the principal Engineer of Maintenance is divided by the Central-Mountain Standard Time Zone at North Platte. In fact, Fisk lives in the Central time zone and his North Platte shop headquarters are technically in the Mountain zone.

But this is not the most unusual aspect of Fisk's daily work. His 750-mile road-maintenance job, located as it is in the western Nebraska sand-hill country and the Platte Rivers basins, involves a number of problems which maintenance engineers more fortunately located in areas with better materials never encounter.

The area offers no crushed rock—only $\frac{3}{8}$ -minus pea gravel, and that round. It has tricky loess soils so fine that they pass through a 200-mesh sieve. Sand hills are so soft that motor-vehicle travel is impossible until they are treated. These are a few of the conditions Fisk has to cope with. His 750 miles constitute only a bare 60 per cent of the total mileage of highways in District 7. Imagine this region criss-crossed by Federal and state highways, including U. S. 30, principal summertime tourist route to and from the west, and you have some idea of the magnitude of the job.

Country Rich in History

To understand the district's highway maintenance problem today, it helps to know something of the past history of this great region. It is the land of the Pawnees, of the old Oregon Trail, of Indian massacres, and of Buffalo Bill.

On a low plain at the confluence of the North and South Platte Rivers, the early pioneers founded what is now the thriving city of North Platte, with a population of 13,000. The river-valley floors were well suited to grow the food crops the pioneers needed. All around, in the vast sand dunes covered by short plains grass, roamed the enormous bison herds. Today these same hills are turning out excellent Hereford and black Angus herds—a fact which explains the necessity for roads back into these areas.

West of North Platte about 75 miles, near Lewellen, is a simple little valley resplendent with a history all its own. Here the original Oregon Trail is marked vividly. The wheel tracks of



C. & E. M. Photo

This view of cold-mix bituminous work in District 7, Nebr., shows a Seaman Pulvi-Mixer drawn by a Case tractor. The machine reduces the work of the blade graders by about 50 per cent, according to Maintenance Engineer Fisk.

covered wagons, still visible where they were winched down to the North Platte river-valley floor, explain better than words can tell the present-day necessity for hill roads and steep grades in the region. At the foot of the hill in this little valley sleep the dead: three

Mormon pioneers of 1847, two little children who died in the bitter wind of autumn, and a camp of pioneer women who were massacred by Indians while washing their clothes along the stream.

An aura of the old west still pervades much of this great country away

from the transcontinental highway. In fact, the region has not changed appreciably with the march of civilization. Where a few families farmed the river valleys 100 years ago, many farmers now do the same. The herds of buffalo are gone, but the same range now produces cattle that goes a long way in providing the nation's beef requirements. And lest we dismiss the buffalo too abruptly, let it be said that one of the chief sources of civic pride in North Platte on July 7, 1948, was the birth of two bull buffalo calves in the park south of town.

This is a land of contrasts: of simple yet cosmopolitan living; of few inhabitants and great land wealth; of pioneer people well versed in the problems of 1948. These people, in this historic setting, demand and get some of the best that life has to offer. It is only natural, then, that they are loud in their demand for good roads. And it also follows that because of the low automobile registration and the shortage of

(Continued on next page)

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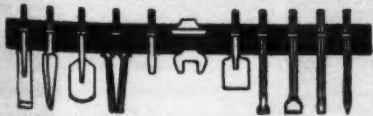
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12 LIME STREET

ROCKLAND, MAINE



Highway Doctoring Among the Sand Hills

(Continued from preceding page)

gas-tax receipts, their demands are tough to fulfill.

Job Being Done Well

How well their demands have been met by the Nebraska Department of Roads and Irrigation, as represented by Fisk and his boss, Harold Easom, District Engineer of District 7, can best be evaluated by two facts. (1) Only once in eight years has the transcontinental highway been blocked by snow—and then for only 8 hours, despite the fact that 16 inches fell during the 8-hour period and the prevailing winds swept across the open country to pile huge drifts on the highway. (2) People in District 7 can get in their automobiles and drive from 50 to 70 miles an hour on any of the state roads.

While they still have some gravel roads to travel over, these gravel roads are dressed four times a week or oftener. Fisk's territory includes 150 miles of concrete pavement, some of it quite new, and 125 miles of bituminous construction, most of it smooth and of a high type. Strangely enough, bituminous roads out through the sand-hill country stand up exceedingly well. They now carry heavy truckloads of beef out to market—truckloads that would have mired down in the sand-dune trails not many years ago. Exactly how these sand-hill roads are built was described in the October, 1948, issue of this magazine, page 1.

District Organization

Fisk normally supervises the work of about 80 men in his maintenance department. At the present time, maintenance work in the balance of the district is being supervised by resident engineers at Thedford and Broken Bow, Nebr.

Fisk is directly responsible to Harold Easom, the District Engineer, and indirectly to John McMeekin, Nebraska's Maintenance Engineer. Directly under Fisk, stationed in each headquarters station, are maintenance foremen and their crews. Elmer R. Noble is at North Platte, R. L. Busteed at Ogallala, and David E. Webster at Kearney.

Each maintenance foreman has a crew which usually averages about 25 men. In this crew are special asphalt gangs, concrete-repair crews, motor-grader operators who patrol the main roads, and a few roving patrolmen who maintain a steady vigil in snowstorms, floods, or other emergencies.

The organization is so set up that key men can work through the winter on jobs that are necessary, and there is a strong personal incentive for these men to stay with the work of the highway maintenance department. Such winter work consists of snow removal, crack pouring, flood control on streams that threaten the highways, and the maintenance of equipment.

Distribution of Equipment

Equipment, always a problem on maintenance work, is just as hard for Fisk to obtain as it is for other maintenance engineers all over the nation.

What he has, he has to allocate for the most efficient use.

The district has two draglines which come in handy for casting material up on shoulders, for ditch cleaning, and for loading filler material and gravel for some of the bituminous mixes. It also has a small self-propelled late-model Wood Roadmixer. These special-purpose items of major equip-

ment are therefore used on a district-wide basis, assigned to the jobs most urgently needed at the time. From three to four motor graders are also shifted around on asphalt work throughout the district.

Up at Ogallala, R. L. Busteed has much of the bituminous mileage in Fisk's territory. He therefore controls an asphalt-unloading station on the Union Pacific Railroad lines. An as-

(Continued on next page)

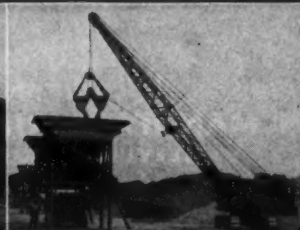
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phalt-storage tank, an asphalt pump, and a small Kewanee boiler do duty there.

Three diesel motor graders are also assigned to Busted for use on bituminous work. Two of these machines are new Caterpillar No. 12's, and the other is a Galion. He also has two tractor-mounted front-end loaders, a Galion tandem roller, a pull-type smooth roller, a pull-type pneumatic roller, and five dump trucks. For gravel-road maintenance in this station, there is a Caterpillar motor grader and one of the new underbody scrapers mounted on a Four Wheel Drive truck.

Similar equipment for gravel-road upkeep is located at North Platte and Kearney. North Platte is in the center of much of the concrete mileage on U. S. 30. At these yards are a 2-sack concrete mixer for patching slabs, compressors, jackhammers, a front-end loader on a tractor, a motor grader, a tar kettle for crack pouring, and five dump trucks.

Kearney, too, is a concrete headquar-



C. & E. M. Photo
At Ogallala, Nebr., center of much of the bituminous mileage in Fisk's territory, this asphalt-storage tank and Kewanee boiler do duty.

ters. Here are a 3-sack mixer, a batching bin, a Scoopmobile, a tar kettle, a compressor and pneumatic equipment, and five trucks. Two heavy-duty Allis-

Chalmers motor graders work on ditch cleaning and bituminous construction from here.

Each yard has a shop and repair fa-

cilities. Equipment repair is keyed to a policy of parts replacement where possible, so no elaborate machine shops are maintained. When a piece of equipment breaks down, District Mechanic Elmer Sanders begins his battle for parts, and usually the down time is limited to the day or so it takes mechanics to replace the parts.

Concrete Roads

Principal failures of concrete roads center around the disintegration of the concrete, subgrade failures, spalling, and expansion blowouts. Extensive failures are occurring on concrete sections about 14 years old.

The maintenance of these concrete roads has been standardized throughout the district. When a section gets bad enough to replace, maintenance crews usually patch the old concrete, removing the disintegrated or broken pieces and pouring fresh concrete. Then a hot-mix asphaltic top is laid, usually by contract. On one such job in 1947, a clause was inserted in the contract specifications providing that all old concrete removed be broken down to 2-man size, so that it could later be put through a crusher and re-used in bituminous work. About 3,000 tons was removed without having to enforce this clause of the specifications, disintegration of the old concrete was so extensive.

Where checker-board surface cracks have appeared, but are not yet bad, Fisk finds that an armor coat of bituminous material retards disintegration and improves the slab, adding years to its life. He prefers 70-degree weather for armor-coat work rather than a 110-degree day which sometimes occurs in July and August.

For armor-coat work, a fine mist-like shot of RC-2 asphalt, cut back to about an RC-1, is applied at the rate of 0.05 gallon per square yard. This material is then exposed to traffic for three or four days, long enough to let the cutting agent evaporate. A 0.15-gallon shot of RC-2 is applied, and $\frac{3}{4}$ -inch-minus pea gravel and sand are then laid down by truck-mounted spreader boxes at the rate of about 2 cubic yards per station of 22-foot road.

Maintenance forces also lay cold-mix bituminous mats on concrete highways that have started to fail. This material is usually road-mixed on roadside platforms by motor graders or the Wood Roadmixer. For this mix, sand and gravel are used as filler, and about 5 per cent of MC-2 cut-back asphalt cements the mix together. When the Wood Roadmixer is used, MC-3 asphalt can be run.

A Seaman Pulvi-Mixer was recently assigned to the district, and has performed successfully on bituminous mixing, according to Fisk. When the Seaman mixer is used with two motor graders, work of the graders is reduced by as much as 50 per cent in mixing the asphalt in the windrow of sand and gravel. The asphalt is added in several shots at a temperature of about 180 degrees, and the windrow is then stacked and blended.

Each autumn, about 2,000 tons of this material is mixed the same way and stockpiled for later use in the winter for patching concrete and bituminous roads.

Subgrade failures under concrete highways are still the number-one cause of many headaches. Much of the bituminous upper-deck work now being done can be traced directly to weak subgrades.

Joint pumping is a rather commonplace occurrence, particularly in the wet winter months. Some asphalt undersealing and mud-pumping has been done at the joints to ease this type of difficulty. Where failures have occurred at the joints, the broken concrete is removed, the subgrade excavated and refilled with granular material, and a new

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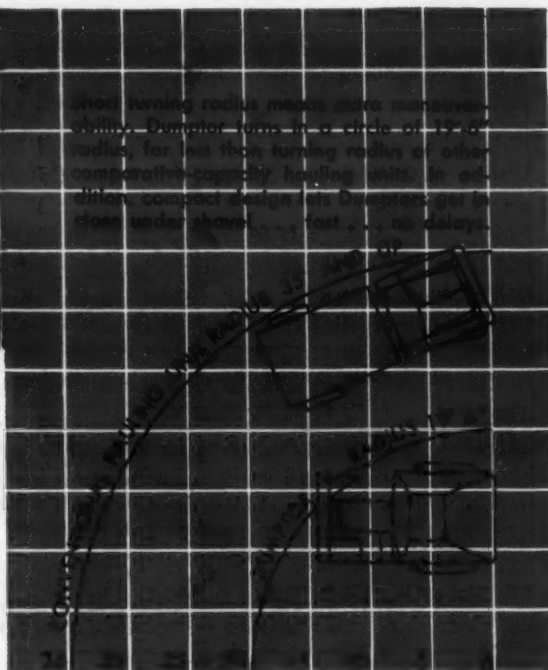
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Highway Doctoring Among the Sand Hills

(Continued from preceding page)

concrete patch made. Fisk tries to keep the patches a minimum size of 4 x 6 feet, and the concrete mixers operate from a central mixing site near the job. Dump trucks transport the mixed concrete. During 1947's concrete patching, the removal and replacement of the material cost the maintenance department \$5.50 per square yard.

About Thanksgiving Day, cold weather sets in, and the concrete highways contract to the point where the cracks open up. From then on through January, maintenance men use a tar kettle and buckets to pour hot tar-asphalt mix. When the weather gets hot, and this material starts to protrude, a motor grader cuts it down smooth again.

On one "blowout" in 1946 near North Platte, the area of pavement affected was cleaned out 18 inches wide, and the space filled with joint-pouring compound. Slowly but surely the pavement continues to crawl and threatens to close the 18-inch gap. Every two months or so the asphalt humps up to the point where it has to be dressed off.

Bituminous Roads

Bituminous roads have one thing in common with concrete construction. If the subgrade is weak, they fail sooner. Failures in bituminous highways are almost all traced to this cause, and are aggravated by freezing and thawing of the subgrade in winter. Other causes of failure are asphalt-mat shoving and heavy loads.

Fisk has learned one bituminous lesson well. In his territory, density does not necessarily mean stability. In fact, considerable sacrifice is currently being made in bituminous density to get better stability of the mix, using from 65 to 90 per cent aeration of the material. There have been some cases of surface raveling, but if the mat is stable this can always be corrected by a low-cost armor-coat treatment.

Almost invariably, when the emphasis is placed on density, and when generous quantities of asphalt are used, the finished pavement shoves. When this happens, maintenance crews have to go back, take up the mat, re-mix and re-aerate it, and lay it back down again. Some good results have been obtained when this has been done.

Bituminous roads are generally being improved for heavier traffic by thickening the asphalt mats from year to year. Some routine patching of potholes is also done with pre-mixed cold-patch material. Armor-coat work goes on with bituminous roads just as it does with concrete construction.

The bituminous roads through the sand-hill country have stood up exceptionally well. Last winter, when the rest of the country was having extensive trouble with its highway system, failures on the sand-hill roads were

limited to small surface checks and breakage of the sides of the highway along the edge of the shoulder.

Auxiliary Maintenance

While maintenance of a smooth-riding surface comes first in priority, Fisk's men are busy doing other things as well.

Dirt washes in from the slopes, and ditches have to be cleaned. Motor graders do this work for the most part, depositing the material back on the shoulders from where it usually comes.

Shoulders and right-of-ways need annual attention. Fisk has found that wide, flat shoulders invariably let water get under the paved surfaces of his roads, to their great detriment. Shoulders along the Nebraska highways in District 7 are therefore usually wide enough to let a car get off the road to park, but they are pitched on a downward slope to let the rainfall drain away. The motor graders do this shaping. If excess material is pulled up in ditch cleaning—material that would

make the shoulders too flat if it were deposited on them—it is hauled away.

Three times a year the shoulders are mowed to the bottom of the ditch line. On the last autumn clean-up, the weeds are cut out to the right-of-way limit lines where possible, to help prevent snow from drifting. Considerable weed-removal work is done around bridge abutments, guardrails, and other inaccessible places by spraying a solution of 2,4-D over the noxious plants. A solution of 3½ gallons of the chemical to 750 gallons of water is used, and is applied from a small tank powered by a Wisconsin engine and a centrifugal pump. Two spray bars and hand hose will reach any of the weeds. Some favorable results have been obtained.

Very little bridge upkeep is needed in the district, fortunately, but several bridges do cross the Platte Rivers and other streams. When the rivers get up, they seldom endanger the bridges themselves, but they do form obstructing islands just ahead of the bridges, which then divert high water into the



"Couldn't we busy ourselves around the office days like this?"

approach embankments. The removal of these islands with bulldozers is a winter job, when the river is low or dry. Channels are re-opened, bank protection in the form of groins is built, and a few retards are even built with wood piles and cottonwood trees.

(Concluded on next page)

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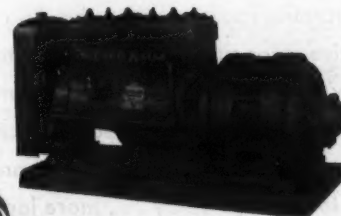
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STATIONARY



TOOLS for the JOB

Schramm Inc. also has a complete line of Pneumatic Tools to offer and recommend for operation by their Compressors.

These include Rock Drills, Paving Breakers, Trench Diggers, Clay Spades, Backfill Tampers, Tie Tampers, Sheeting Drivers, Demolition Tools, Chain and Circular Saws.

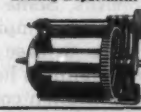
Write for bulletins and prices.



HOISTS DERRICKS WINCHES

A Complete Line of Builders' Derricks and Winches—nationally known for dependable service and long life.

Write for Catalog or send your problems to our Engineering Department



The Sagen line is handled by leading equipment distributors everywhere.
SASGEN DERRICK COMPANY
3191-27 W. Grand Avenue, Chicago 22, Ill.

Snow removal is an all-winter problem, but it is solved by using three push plows and two heavy V-plows at each station. There is also a Snogo at Broken Bow, which can be called down in case of emergency. Snow-removal procedures are all geared to the principle that it is far easier to keep a highway open than it is to unplug it after snow has drifted it shut.

Very little roadside work is done, except for the cultivation of low-growing grasses to eliminate as much erosion as possible.

Gravel Roads

Gravel roads are maintained on an all-year basis. During wet weather they are hard-surfaced, but the motorist hardly notices any of the small pea-gravel particles from the Platte River deposits. Then as dry weather comes along, the small rocks begin to appear. Motor graders blade the roads four times a week or oftener to keep this loose material windrowed along the side. Unless they do so, the material corrugates and washboards, and an undesirable surface results.

It is only by keeping equipment busy at capacity, holding the size of the crew down, and working every man as efficiently as possible that the road system is maintained so successfully on a relatively small maintenance budget.

One of the other problems Fisk admits he doesn't enjoy is this matter of people who criticize unjustly the activities of maintenance employees. But he says that it's always interesting and often helpful to get their opinions on an operation. For example, a flagman is holding one lane of traffic for a while.

"It's about time you fixed this sorry highway," one motorist will scream. "Why, I drove all the way across the country, and Nebraska has the worst roads in the nation!"

Others will complain: "Why are you all tearing up this fine piece of road? Hell, it's better than any I saw in Wyoming and Colorado!"

Fisk can't satisfy them all. He must first try to satisfy himself that the best possible job is being done. That accomplished, he just goes ahead, listens courteously to the motorists, and insists that his foremen clean everything up each night, leaving nothing hazardous on the highway where the careless driver can become involved in a serious accident. Fisk is very conscientious about the safety angle, knowing that motorists can drive 60 miles an hour and more on the road system he fights to maintain.

Light-Duty Trencher

A tractor-mounted trenching unit is manufactured by Mississippi Engineering Co., Inc., Grand Mound, Iowa. It is designed to dig a trench measuring 7½ to 10 inches wide and 4 to 5 feet deep. According to the manufacturer, the McDonald E-Z Mount trencher will dig through hard frozen ground at rates



The McDonald E-Z Mount trencher will dig trenches 7½ to 10 inches wide and 4 to 5 feet deep. It can be operated by any standard power take-off.

of from 300 to 375 feet per hour.

The E-Z Mount is operated by any standard power take-off unit. An extra-heavy high-speed roller chain is used to drive the digger blades, which have specially treated cutting edges. The unit is sold complete with a scraper, depth control, winch, and attachment kit. All adjustments and operations are controlled from the operator's seat.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

Power Units in Wide Range

A line of standard power units ranging in capacity from 7 to 400 hp is described in a 40-page pocket-size catalog issued by the Waukesha Motor Co.,

Waukesha, Wis. Bulletin No. 1408 is divided into four sections: the first tells about the Waukesha Co.'s plant and facilities; the second lists the complete Waukesha line of power units; the third tells how to estimate the power required to run various types of equipment such as generators, pumps, and rock crushers; and the fourth covers horsepower ratings for each unit, at various speeds, and the standard corrections for extremes of altitude or operation in high temperatures.

A double-page spread is devoted to each model in the line—the construction of its engine, its cooling system, fuel system, power take-off, starting, mounting, controls and instruments, governor, and other standard equipment. Dimensions are given for the engine bearings, bore and stroke, connecting rods, displacement, fuel tanks, pistons, valves, etc. Also included is a performance chart for each engine.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 103.

In Georgia limestone . . .

Dual Impact Action does it again



New Holland Model 5050 Double Impeller Breaker
reduces 50" material to commercial sizes in single pass . . .

• Like all New Holland Breakers, the new Model 5050, recently installed by Lambert Brothers, is a field development . . . designed to work in all types of rock, under all conditions . . . built to produce maximum aggregate at minimum cost. Simple, sturdy construction keeps costs down—production up.

Here are some quick facts—more on request:
Produces up to 400 tons per hour on 300

h.p. Heavy duty steel outer plates. Interior lined with manganese steel wear plates. Spherical roller bearings. All parts accessible; all adjustments easily made by average workman. Mounted on heavy I-beams to simplify installation. Weight 54 tons.

New Holland Double Impeller Breakers are used, recommended by operators everywhere. Get the facts. Write for complete information including location of installation nearest you. Address: Department C-39.

Read

what W. E. Lambert, of Lambert Brothers, Knoxville, Tenn., says about New Holland Model 5050 Double Impeller Breaker shown above.

"The ability of this breaker to reduce 50" material to commercial sizes in one pass is remarkable . . ."

W. E. Lambert

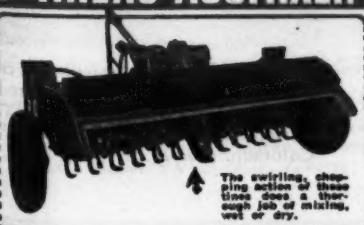


NEW HOLLAND DOUBLE IMPELLER BREAKERS

NEW HOLLAND MANUFACTURING COMPANY, MOUNTVILLE, PA.

Affiliate of the Sperry Corp

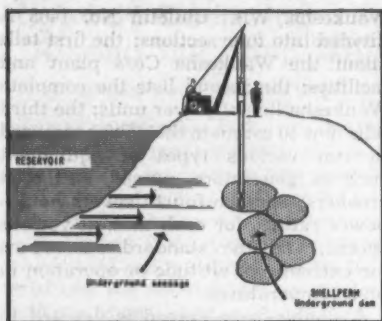
FOR SECONDARY ROAD CONSTRUCTION... ARIENS AGGMIXER



The swirling, chopping action of these three discs does a thorough job of mixing, wet or dry.

ARIENS' equipment designed especially for mixed-in-place construction—to operate in conjunction with other general purpose equipment. Whatever aggregates are used it thoroughly pulverizes, mixes and carries aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. . . . made 4 standard sizes, 4', 6', 8' and 12'. Write for details.

ARIENS COMPANY BRILLIANT WISCONSIN



No excavation is required with the Shellperm method to check subsurface seepage. Asphalt emulsion is pumped underground through metal pipes where it forms an impermeable barrier.

Asphalt Dam Checks Subsurface Seepage

Control of subsurface water seepage around tunnels, roadbeds, earth dams, and other structures—without excavation of any kind—is possible through the use of a method announced by Shell Oil Co., Inc., 50 W. 50th St., New York 20, N. Y. The Shell method consists of building a permanent underground dam of asphalt material which is injected into the earth through a pipe. The method is marketed under the trade name of Shellperm.

In the Shellperm process, an emulsion of asphalt and water is pumped under low pressure through a metal pipe which is driven into the ground to the depth desired. As the asphalt emulsion emerges from this pipe, it spreads out into the pervious material, the Shell Co. explains. Chemicals mixed with the emulsion cause it to coalesce, producing an asphalt mass which is impermeable to water.

After the first injection, the pipe is raised, and additional Shellperm is pumped down to form a second impermeable mass. This process is repeated until a vertical column of asphalt of the proper height has been achieved. The pipe is then moved, and additional injections made to create another column. This process is repeated until abutting or overlapping columns form an underground dam.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 122.

Clutch-Control Pump For Hydraulic Power

A hydraulic pump with a clutch control is announced by the Waukesha Hydraulic Corp., Dept. 1228, P. O. Box 414, Waukesha, Wis. It is recommended by the company for use with tractor-drawn equipment, hydraulic dump bodies, powered tail-gates, hydraulic bar benders, and other equipment requiring a source of hydraulic power. The Hydra-Clutch is designed to operate only when power is actually required.

A single lever is used to engage or disengage the clutch and to operate the slide valve. The Hydra-Clutch pump contains an overload relief valve, and is operated from a tractor or truck fan belt or other source of supply. The pump is 7 inches long, 7 inches high, and 4 inches wide.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 75.

Staff Changes for Fuller

Changes in officer personnel are announced by the Fuller Mfg. Co. of Kalamazoo, Mich. J. Seton Gray is named Chairman of the Board of Directors. He is succeeded as President of the company by E. L. Ludvigsen, formerly Vice President and General Manager of the Transmission Division. Harold E. Brey, formerly Vice President and General Manager of the Unit Drop Forge Division, is named Executive

Vice President. William E. Ninness is now Vice President in Charge of Sales; and Thomas Backus, Vice President in Charge of Engineering. Eric A. Pullan remains as Secretary and Treasurer.

Frank C. McManus, formerly Factory Manager at Kalamazoo, is named Manager of the Transmission Division; and E. L. Block is appointed Manager of the Unit Drop Forge Division.

An Architects' Reference On Steel Framing Members

Complete information on the use, design, and specifications of Stran-Steel framing members has been prepared in booklet form by the Great Lakes Steel Corp., Stran-Steel Division, Penobscot Bldg., Detroit, Mich. In addition to its

use as a reference, the book is also intended to serve as a drafting-room guide.

Details are included on the use of the Stran-Steel members for exterior and interior-wall construction, and for floor and ceiling construction, and on the manner of applying insulation, utilities, and ducts. The manual shows dimensions of typical main members including joists, studs, and plates. It also contains engineering data on properties of the Stran-Steel sections, formulae for determining loads and deflections, and tables of safe loads for the various sections. The book is made up almost entirely of drawings.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 92.

Marble-Cutting Wheel

A segmented type of diamond wheel designed especially for cutting granite and marble is announced by the Felker Mfg. Co., Torrance, Calif. The Di-Met Kimberley, as it is called, has diamond segments which are 3/16 inch in depth; the diamond particles are anchored in an improved metal bond, says Felker.

The Kimberley wheels, which are designed for wet operation, have special rim slots and holes to assure greater penetration of the coolant. The wheels are available in diameters of 14 to 24 inches, with arbor holes to fit all standard machines.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 105.



LOW INITIAL COST
plus
LOW MAINTENANCE COSTS

CRUSHING AND SCREENING PLANTS



900 CUBIC YARDS of 1" material and 725 cubic yards of 3/4" produced in 9 hours by this Cedarapids Portable Unitized Crushing and Screening Plant in Wisconsin. The plant consists of a jaw crusher primary and a roll crusher secondary.

Low first cost, low operating cost, minimum repair and maintenance — that's where your annual savings begin with Cedarapids Crushing and Screening Plants! And savings *continue*, year after year! With Cedarapids plants on the job, you get a combination of high capacity flexibility, portability and low operating costs that keep you consistently in the money. Smooth, balanced coordination of screens, crushers and conveyors... instant adaptation to a wide variety of jobs... fast, easy set-up and take-down... all add up to more profitable operation. There's a wide range of sizes and types for every production need. From the smallest unit to the largest plant, Cedarapids Crushing and Screening equipment is built for high output at low cost.



100 CUBIC YARDS per hour of 3/4" aggregate from this Cedarapids Junior Tandem. This plant is operating between the Elk River and Big Lake in Minnesota, producing aggregate for gravel surfacing shoulder and for black topping inter-sections.

35 CUBIC YARDS an hour with 55% of material crushed. That's easy production for this Cedarapids Pitmaster, the smallest complete tandem portable crushing and screening plant in the Iowa line. Operating in Canada.



260 TONS per hour with 35% crushed of minus 1" material! That's the production record of this Cedarapids Master Tandem Portable Crushing and Screening Plant in Colorado. (above)



Cedarapids
Built by IOWA

THE IOWA LINE OF PORTABLE CRUSHING AND SCREENING PLANTS INCLUDES: JAW AND CONE CRUSHERS • ROLL CRUSHERS • STEEL ROLLERS • SPLITTER PLANTS • VIBRATING AND ROTATING SCREENS • STRAIGHT LINE SINK AND GRAVEL PLANTS • JAW TRAYS • PORTABLE POWER CONVEYORS • PORTABLE STONE PLANTS • PORTABLE PLANTS • REACTION CRUSHERS • ROLLER TYPE PLANTS • MARBLE CRUSHERS • SCRAPER TANKS • WASHING PLANTS • CONVEYOR UNITS • STEEL AND TRUCKS • RUBBER IMPACT BREAKERS • The Year's Dependable Distributors For Full Details

UN Building Bonds Set a Record High

The performance and payment bonds covering the construction of United Nations headquarters in New York City are believed to be two of the biggest surety bonds in the history of the insurance business. These bonds are for \$23,809,573, and are written to the full amount of the contract price.

They were arranged by The Aetna Life Affiliated Cos. of Hartford, Conn., with the help of the Maryland Casualty Co. and the National Surety Corp. A record number of other insurance companies—20 in all—have signed up as co-sureties to share part of the risk.

The bonds cover the contract for the construction of the 39-story secretariat

of the United Nations. They also cover the completion of foundations for the other structures which will be erected on the UN plot. The contractor is Fuller-Turner-Walsh-Slaterry, Inc., a firm established by four of New York's largest contractors to undertake the project. The four cooperating firms are the George A. Fuller Co., Turner Construction Co., Walsh Construction Co., and the Slaterry Contracting Co., Inc.

Catalog on Line of Hoists

Light, medium, and heavy-duty hoists are described in a catalog distributed by the Novo Engine Co., 702 Porter St., Lansing 5, Mich. Hoist features which are listed in Bulletin H include welded-steel base, sturdy side frames,

long-lived drums, replaceable shrouded ratchet, automatic pawl release, perennial friction blocks, automatic drum release, self-energizing brakes, high-pressure lubrication, and responsive controls.

Specifications presented for the Novo hoists include model number; power-unit type, horsepower rating, and revolutions per minute; type of drive; line pull and line speed; diameter, length, and flange diameter of the drum; sizes of wire rope and drum capacity for each size; and the weights and dimensions of each hoist. Complete specifications are also given for the line of drag-scraper and mining hoists which Novo makes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 51.



The Model 8502 Coles crane—one of several models available—has a 7½-ton capacity and is powered by a Ford gasoline engine.

Mobile Crane Units In Models to 15 Tons

Pneumatic-tire-mounted self-propelled cranes are manufactured by Coles Cranes, Inc., 4318 S. Paulina St., Chicago 9, Ill. Each of the four motions—hoisting, swinging, derricking, and traveling—is activated by a separate power unit, and all can be operated simultaneously. The Coles cranes are made in a capacity range of from 1½ to 15 tons. They are also available for mounting on truck or railroad chassis.

The brakes are electro-magnetic and are automatically applied in hoist, boom hoist, and swing. The hydraulic brakes for the rear wheels are operated by lever or pedal. The cranes can be equipped with several types of attachments, such as clamshell buckets, magnets, demolition balls, etc. They are powered by Ford gasoline engines; or they can be equipped with diesel power units. And they all have automatic safe-load indicators. A patented reversible steering is said to provide normal steering of the unit regardless of the position of the boom.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

Improved Hand Level

An improved precision hand level is announced by the Brunson Instrument Co., 1405 Walnut St., Kansas City 6, Mo. As a special feature of the unit, the level vial has been built inside the instrument. The manufacturer also explains that the level has an adjustment which is pre-set and maintained by spring tension; and that the prism and lens are mounted in a one-piece frame to prevent any change of adjustment due to movement of these parts.

Complete details on the Brunson hand level have been included in a pamphlet available for distribution. This pamphlet shows the internal construction of the level and lists the cost of each part. It shows how to use the level, and how to clean and adjust it.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 71.

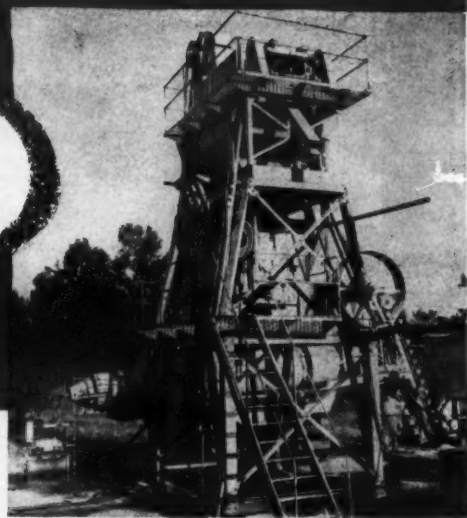
A Brief History of Cement

The high points in the development of cement have been outlined in an interesting booklet put out by the Lehigh Portland Cement Co., Allentown, Pa.

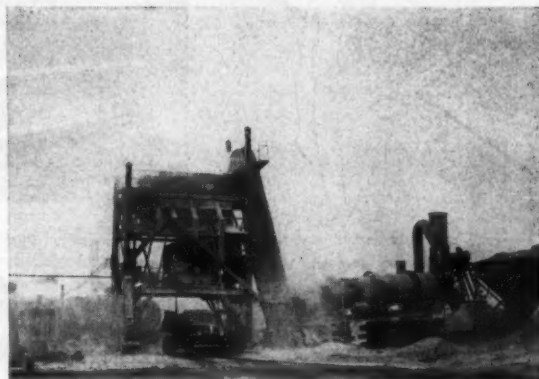
The book describes the manufacture of cement in detail, and discusses important events and dates in the development of cement as we know it today. It tells of famous cement men—John Smeaton and the Eddystone Lighthouse, Joseph Aspdin and his method of making portland cement, and David O. Saylor and the other men who established the cement industry in America. The book concludes with a section on the importance of the cement industry, and one on the founding and present facilities of the Lehigh cement company.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 63.

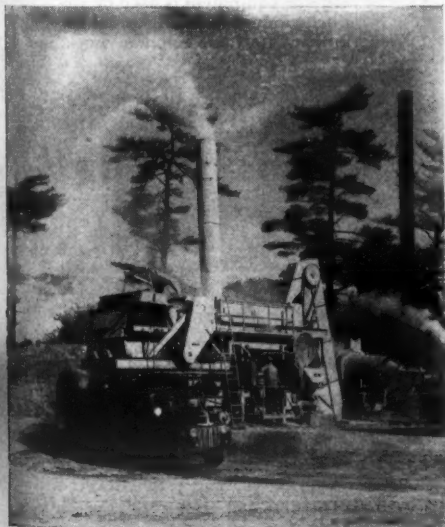
BITUMINOUS MIXING PLANTS



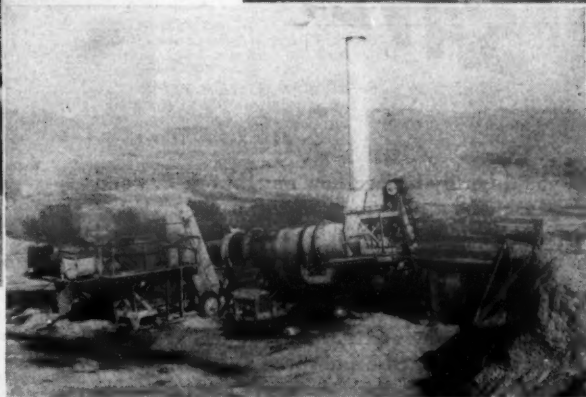
200 TO 250 TONS per day produced by this Cedarapids 1000 lb. Model "A" Bituminous Mixing Plant in Alabama. Another production record for Cedarapids.



100,000 TONS of thoroughly mixed bituminous material produced by this 3000 lb. Cedarapids Model "E" Batch-Type Bituminous Mixing Plant and another 2000 lb. Model "E" Batch-Type Plant for resurfacing airport runways. (right)



As much as 350 TONS per day of bituminous materials, thoroughly mixed, were produced by this Cedarapids Super-Portable Model "FA" in Ohio. (above)



20 TO 30 TONS per hour production is obtained from this Cedarapids Portable Patchmaster, a volumetric type bituminous mixing plant in Iowa.

LEHIGH PORTLAND CEMENT CO. MANUFACTURING COMPANY
Cedar Rapids, Iowa, U.S.A.

Setback Levee Built With a Big Dragline

Casts Dirt Directly From Pit to Embankment With 140-Foot Boom and 6-Yard Bucket on Walking Rig

A NEW setback levee 8,400 feet long has been completed along the right bank of the Atchafalaya River in St. Landry Parish, about 3 miles south of Krotz Springs in southern Louisiana. This river levee, which is also the east guide levee of the West Atchafalaya Floodway, takes the place of a 12-year-old embankment that was threatened by caving banks. The new setback is about 900 feet behind the original levee, and is known as the Bayou Bigrow levee.

The construction is part of the flood-control program of the Department of the Army, Corps of Engineers, New Orleans District. The work was done by the Walter P. Villere Co. of New Orleans, using a Bucyrus-Monighan 200-W walking dragline equipped with a 140-foot boom and a Hendrix 6-yard perforated bucket. The contract, which was awarded on a low bid of \$78,913, included 365,000 cubic yards of embankment. Work got under way the middle of January, 1948, and the project was finished in June. A new road follows the land side of the levee.

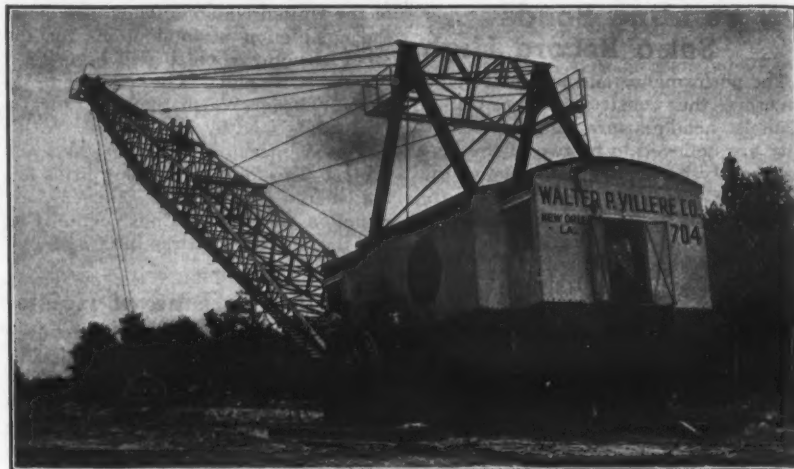
Clearing the Site

For about 6,000 feet of its 8,400-foot length, the right-of-way for the new structure went through woods thick with gum, tupelo, cypress, sycamore, oak, and elm. The remainder of the distance was over open fields. A crew of 12 men took about two months to clear the land. The larger trees, which averaged 12 inches in diameter, were felled with a couple of power saws. The lumber was generally used either for fence posts or for railroad cross ties. Some of the trees were pulled over by a pair of Allis-Chalmers HD-7 tractors outfitted with Gar Wood winches. The brush was dozed up into piles by two tractor-dozers—an Allis-Chalmers HD-10 and a Caterpillar RD8—and then burned. Stumps were either blown apart by a few sticks of dynamite, or pushed over by the dozers. The elms, with their widespread roots, gave the most trouble.

To facilitate location and removal of any subsurface obstacles such as buried tree trunks, old pipe lines, etc., that would cause seepage under the levee, an inspection ditch was dug the full length of the right-of-way. This ditch, 6 feet deep and 7 feet wide, was located 30 feet off the center line towards the land side of the levee. Excavation was done by a Lorain TL-20 dragline with a 35-foot boom and a Page ½-yard bucket. The ground chosen for the base of the levee was also stripped by the smaller dragline, and then plowed open with an eight-disk harrow pulled by one of the tractors. This permits a better bond with the new embankment.

Subsidence plates were laid out along the base of the levee at 100-foot inter-

vals. They were made of wood, 3½ inches thick and 4 feet square, and were covered with tar paper. Their elevations were carefully noted before any material was placed in the levee. Later, when the embankment was completed, ¾-inch pipe in 8 and 12-foot lengths was forced down through the dirt by hand; weight was applied through several wrenches. The driving stopped when the plates were reached, and level readings were taken on top of the measured lengths of pipe. In this way any subsidence of the great mass of earth was detected, and the contractor was sure to be paid for all the material he placed in the levee. Settlement of dirt within the levee area would not show up in the cross-section surveys.



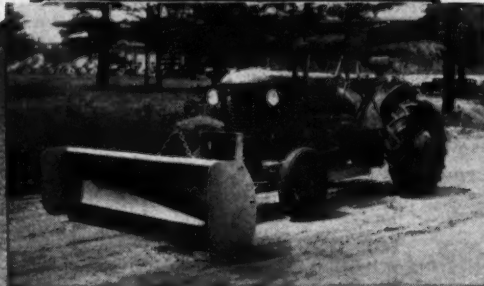
C. & E. M. Photo

The Bucyrus-Monighan 200-W walking dragline which the Villere Co. used on its levee contracts "walks" ahead on a timber mat, keeping its boom extended out in front.

Moving in the Dragline

While these preliminaries were under way, No. 704, the contractor's Bucyrus-

Monighan 200-W walking dragline, was being moved from a levee job it had
(Continued on next page)



Model "VAI" with hydraulically controlled crosswalk plow. For this and other Case tractors there are sidewalk, street and highway plows in a variety of types.

Now is the "VAI" equipped with power sweeper, cleaning sidewalks at height of storm. Similar equipment is used by airports, industrial plants, etc., for both winter and summer work.

Year 'Round MAN SAVERS



● Until you see it, you'd hardly believe how much work . . . and how many kinds of work . . . a man can do with a Case "VAI" tractor and the mounted equipment made for it. Built to be used with mounted equipment, the "VAI" is slim-waisted, for side clearance and extra visibility. It has plenty of under-clearance, too—room for mounting and movement of structural members.

Teamed with the Case Highway and Airport Mower, as shown in top scene, the "VAI" brings new ease and speed to mowing amid obstacles. With its hydraulic pump direct-driven from the engine there are "no gears to shift to work the lift." At a touch of the control valve, the cutterbar raises, lowers, or holds at any desired position—regardless of whether the tractor is moving, stopping, or standing.

Model "VAI" is smallest of the four basic sizes of Case industrial tractors, ranging in weight from 2500 to more than 10,000 pounds. All have heavy-duty, Case-built engines.

Complete, Competent Service

Your Case industrial dealer is located to serve you conveniently, staffed and equipped to serve you well. Besides Case tractors and engine units he offers related equipment such as tractor-mounted loaders, mowers, snowplows, sweepers, bulldozers and scrapers. Specializing in the power and equipment problems that prevail in your area, he has broad experience that can be helpful to you. J. I. Case Co., Racine, Wis.

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just finished on the left bank of the Mississippi River at Norco, above New Orleans. It was loaded on a 48 x 150-foot barge and towed down the Mississippi to the Intracoastal Waterway, then west to the Atchafalaya, and up that river to the upper end of the project. At this point the river was still about 600 feet away from the old levee, and was not washing up against it as was the case farther south about the middle of the job. Accordingly, the barge, which drew about 3 feet of water, was brought right up to the river bank. It was anchored there by means of a couple of deadmen made of large sections of tree trunks about 12 feet long and buried 6 feet deep in the ground. Cables 1½ inches in diameter pulled the barge in close to the anchorage.

Then the huge machine walked the river bank on mats under its own power until the old levee was reached. The dragline cut a hole in the embankment just large enough for it to get through and to within about 6 feet of the base. The rig passed through the levee, then filled the hole behind it, and proceeded on to about the middle of the project. It began building levee, working towards the lower end but stopping when about 900 feet from the old levee. The section from the center to the upstream end was built next. But again the machine halted when within 800 feet of the end of the levee.

These gaps were left during the early phases of the work because of the high water in the river; for when the water is up, deep borrow pits may not be excavated immediately landward of the controlling levee. Consequently the tie-ins at the upstream and downstream ends of the new levee were not made until late in the work when the Atchafalaya fell, thus permitting work in the borrow pits close to the old levee, and the use of the material in the old levee.

New Levee Section

The new setback is similar in cross section to the original levee. From an average ground elevation of 23.5, Mean Sea Level, the new levee was built up to 41.2 grade, giving it a height of around 18 feet with a 10-foot crown. On the land side the side slope is 4 to 1 down to a 40-foot-wide berm at elevation 29.5. This berm provides space for a new road that will follow along behind the big earth embankment. The

state and Federal governments will put a shell surface on this road, after which the former road behind the original levee will be abandoned. From this berm highway, the side slope of the embankment continues on a 3 to 1 until the original ground is reached.

On the river side the slope is 3 to 1 to natural ground. Beyond the toe there is a 40-foot berm or batture after which the borrow pit begins with a drop of 3 feet in the first 6 feet, followed by a 10 to 1 slope over the balance of the borrow pit. All the material used in the new levee construction was taken from the river-side borrow pit and from portions of the old levee within the borrow pit limits. The far side of the pit is about 265 feet from the center line of the levee, but with the 140-foot boom on the big dragline no rehandling of material was necessary. The setback section averages around 150 feet in width, measured through the base.

Big Rig

Big draglines like this Bucyrus-Monaghan 200-W walker type are not too common around the country. They are found chiefly in regions where great levees for mighty rivers must be constructed and reconstructed, or in coal fields engaged in strip mining. On Villere's No. 704, the 140-foot boom is built of steel tubing braced with structural angles. It is supported on a series of Macwhyte cables tied back to a double A-frame rising out of the cab.

Within the housing is a Cooper-Bessemer 385-hp 6-cylinder diesel engine which powers both the hoist and the drag-bucket line on a direct drive. It also runs a Westinghouse 45-kw generator which supplies power for a Westinghouse 50-hp dc motor that swings the dragline in its 360-degree horizontal circle. A Gardner-Denver compressor supplies air for starting the diesel engine.

The shoes by which it "walks"—one on each side—are 24 feet long x 4 feet wide. They pivot the big machine ahead in 7-foot strides as they are raised, thrust forward, and laid down again. On this job the dragline took an average of three steps, or 21 feet, every two hours. It worked from heavy wooden mats which supported the circular base and the long shoes. These mats were 18 feet long x 8 feet wide, and 8 inches thick. A set of 24 such mats permitted the rig to move ahead without too

much shifting of the timber foundations. Each mat was outfitted with an eye loop which was fastened to a hook of the bucket line hung from the boom. In this way the dragline itself moved the mats quickly ahead without having to disengage the drag bucket. The mats were placed two abreast lengthwise, so as to give a foundation support 36 feet wide running along the ground between the borrow pit and the levee.

Levee Building

During the construction of the levee the smaller ½-yard dragline threw up small retaining dikes at the landside toe of the large embankment to keep water from getting in the fill. This water occurred in places where a small bayou came close to the line of the

levee. Thus the big rig had only to concentrate on dragging material out of the borrow pit, swinging in a 180-degree arc, and piling the material up to form the levee. Casting of dirt was the chief operation, since no spreading or rolling of the fill was required. The slopes were neatly trimmed and dressed by the bulldozers on the job. When the lower sections of the land-side slope were wet from standing ground water, the smaller dragline handled the dressing as it worked from the berm constructed for the road.

The walking dragline worked 24 hours a day whenever the weather permitted. Seldom did the machine stop casting dirt except when it was shifting the mats about, for the mate-

(Concluded on next page)

What makes roads or streets good?



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RICE self-priming centrifugal pumps embody proven developments in pump design . . . features that set high standards in centrifugal pump performance:

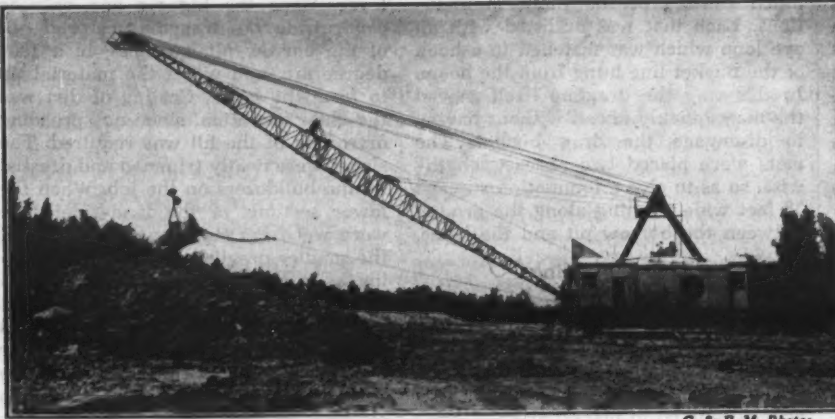
- **AUTOMATIC PRIMING** — simply fill pump body and start engine. Pump primes automatically thereafter.
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RICE Self-Priming CENTRIFUGAL PUMPS



Above: A Bucyrus-Monaghan 200-W walking dragline casts a load of dirt on the Bayou Bigraw levee near Krotz Springs, La. At right is a close-up of the walking machinery on one side of the dragline.



Setback Levee Built With a Big Dragline

(Continued from preceding page)

rial had to be long and thoroughly soaked by rain to bring operations to a halt. From 6,000 to 7,000 cubic yards of earth were moved in an average 24-hour day, and this pace was maintained seven days a week.

Three shifts of workers kept the big dragline in continual operation. Each shift consisted of an operator, an oiler, and a spotter posted up on the levee to direct the placing of the dirt. In addition to this equipment crew, there was also a single day-shift force comprising an operator for the smaller dragline, two tractor-dozers, and three laborers. When darkness fell, the floodlights on the boom of the 704 were turned on to light the borrow pit during the digging and the levee as the cast was made. No other lights were required on the embankment. The maximum depth of cut in the borrow pit was around 18 feet at the back of the pit near the river.

Diesel fuel for the equipment was delivered to the job in tank trucks by the Gulf Oil Co. out of Opelousas, La. Water was loaded into barrels at nearby Krotz Springs and hauled to the site in the contractor's 1½-ton truck. When repairs were necessary, they were made right in the field; part of the maintenance equipment consisted of a General Electric 300-amp electric welder.

Personnel

The Walter P. Villere Co. was represented on the levee construction by John P. Thompson, Superintendent. For the Corps of Engineers, William J. Johnson, Jr., was Chief Inspector. The project was located in the Alexandria, La., Field Office subdivision which is under the supervision of Henry E. McDowell, Field Assistant. The New Orleans District is headed by Col. John R. Hardin, District Engineer.

Officers Elected by WRI

David Larkin has been elected President of the Wire Rope Institute for a one-year term. Mr. Larkin is Executive Vice President of the Broderick & Bascom Rope Co. He succeeds E. C. Low, of John A. Roebling's Sons Co., who became Chairman of the Board. Other new officers are: Vice Presi-

dent, H. C. Parker of the Bergen Wire Rope Co.; Secretary, W. A. Huber of the American Chain & Cable Co.; and Treasurer, D. W. Vernon of the A. Leschen & Sons Rope Co.



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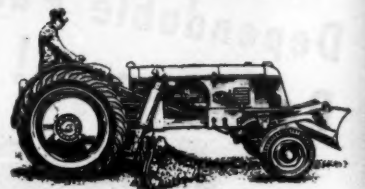
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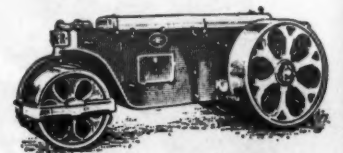
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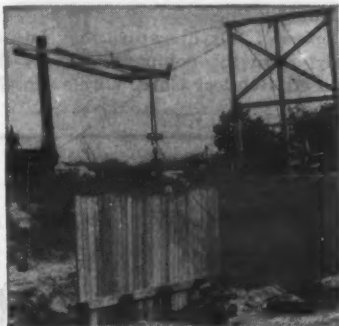
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P&H Zip-Lift hoists were used to speed pile driving in the construction of anti-erosion dams in Colorado. As illustrated here, one of the hoists raises and lowers the steam hammer.

Pile Driving Speeded By the Use of Hoists

Pile driving was speeded by the use of electric hoists in the construction of two anti-erosion dams across a creek near Denver, Colo. The job—awarded to Gage Odell, a Denver contractor—was started by building two 30-foot-tall movable suspension uprights, one on each side of the creek. Steel cables were suspended from these uprights over the span of about 120 feet, and a trolley-type carriage was mounted on them. An electric hoist was suspended from the carriage, and a steam hammer was then hung from the hoist by means of a hook. For this project, Mr. Odell used P&H Zip-Lift hoists manufactured by the Harnischfeger Corp. According to the manufacturer, the operation of the hoist is fast and simple, and the operator is able to drive the sheets merely by pressing buttons.

An operating platform, suspended from the overhead carriage, was raised and lowered by two additional electric hoists. A fourth Zip-Lift was used to move the carriage back and forth across the lines. Current for operating the P&H hoists was provided by a trailer-mounted 5-kw generating set. Approximately 4,000 linear feet of corrugated-steel sheeting was driven during this project.

Further information on the use and operation of the Zip-Lift hoists may be secured by writing to the Harnischfeger Corp., Hoist Division, at 4419 W. National Ave., Milwaukee 14, Wis. Or use the enclosed Request Card and circle No. 58.

Rubber Traffic Cones

Rubber traffic cones which look as if they're made of steel are manufactured by the Enterprise Development Corp., 231 W. Olive St., Burbank, Calif. They can be used to direct traffic around detours, to protect newly painted highway safety stripes until they are dry, and similar purposes.

The Enterprise cones are made of a lightweight rubber. They have hollow centers so they can be stacked in a minimum amount of storage space and carried in quantities in a small truck or passenger car. Their rubber construction minimizes breakage, distortion, and wear, the manufacturer points out.

They are painted in wide stripes of red, yellow, and black, and a special luminescent paint is available if desired. The cones are 11½ inches round at the base and 18 inches high; they weigh 2 pounds each.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 77.

News of Ryerson & Son, Inc.

W. A. Redpath has been appointed Manager of the Philadelphia plant of Joseph T. Ryerson & Son, Inc. He succeeds C. L. Hardy, who has been elected Assistant Vice President of Ryerson. The company also reports that ground has been broken for an addition to its Chicago plant. The new building will

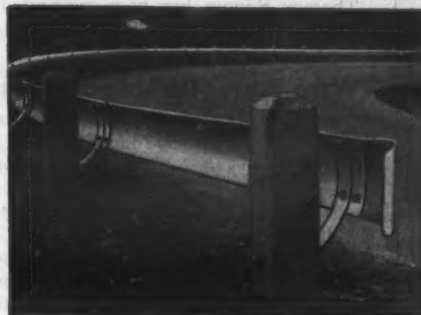
provide approximately 118,000 square feet of plant and office space. It is located at 15th and Rockwell Sts.

How a Decal Is Produced

Data on the use of decalcomanias have been prepared by Superior Decals, Inc., 2827 Fort Worth Ave., Dallas, Texas. The folder lists several advantages claimed for decals when used for marking and identifying construction equipment and tools.

The folder traces the development of a decal from the idea stage to its actual use. It tells how the design is printed on the backing paper, what types of paint and paper are used, how the adhesive is applied, and other manufacturing processes. Photographs show how the silk screen of the design is prepared, how the paint is squeezed into place, and how the transfer is applied.

Copies of this literature are available from the company. Or use the enclosed Request Card. Circle No. 73.



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Chevrolet's 4-SPEED SYNCHRO-MESH TRANSMISSION offers quicker, quieter and easier operation in Series 3800 and heavier duty trucks. Faster shifting maintains speed and momentum on grades.

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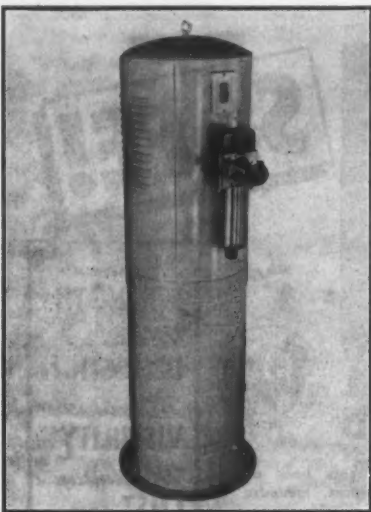
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*Heating and ventilating system and rear-corner windows with de-ice equipment optional at extra cost.

CHOOSE CHEVROLET TRUCKS FOR TRANSPORTATION UNLIMITED!



This new Butler cement aerator permits full control of the flow and handling of bulk cement. It occupies about as much space as a man standing.

Bulk Cement Moved By Compressed Air

A new cement aerator has been announced by the Butler Bin Co., Waukegan, Wis. It is a compact, enclosed unit designed to deliver measured applications of compressed air at critical points in the cement-handling system in order to insure a steady flow of bulk cement.

The aerator is built in two sizes: one with a displacement of 12 cubic feet, and the other with a displacement of 8.6 cubic feet. Both sizes have 60-gallon storage tanks. The Butler unit is said to occupy little more space than a standing man. A special feature of it is a dual pressure take-off which provides air for pumping tires, cleaning equipment, operating air cylinders, etc.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 89.

Steam-Cleaning Unit

A portable steam-cleaning unit is made by the Siebring Mfg. Co. of George, Iowa. It can be equipped with an oil-burning or electrical heating unit, and the steam-generating tank has a capacity of 40 gallons. Among the features claimed for the Siebring cleaner are a visible water-level gage, a safety pop-off valve, and a special safety device in the event that the pop-off safety plug fails or the valve sticks.

A pressure gage on the fuel tank is designed to regulate the oil pressure to the burner unit at about 35 pounds. The oil-burner unit operates on the same principle as a blowtorch. It maintains a continuous steam pressure of 60 pounds, says Siebring, and, with the aid of the automatic water injector, it delivers a constant flow of steam or hot water.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 81.

B & D Branch; Sales Changes

The Black & Decker Mfg. Co. has announced several changes in its branch-office and personnel set-up. A new service station has been opened at 1094 Gilbert Ave., Cincinnati, Ohio, under the supervision of Robert A. Brown, Service Engineer. The Denver service station has moved to a new building at 1010 Bannock St., where it will continue under the supervision of Elmer F. Sitton, Service Engineer. The Chicago sales and service station has also moved to a new building, at 1100 W. Jackson Blvd. R. G. Horner is Branch Manager.

James E. Moore of the Chicago branch has joined the Chicago Sales Department as Sales Engineer. T. J. Waters succeeds him as Service Engineer for Chicago. W. E. Boyles, Service Engineer at the New Orleans branch, has been transferred to Cleveland as Sales Engineer. He is succeeded in

New Orleans by R. B. McClellan. Thomas Rogers has been promoted to Sales Engineer at the Dallas branch.

Wire Rope: Its Use and Care

A pocket-size handbook on the use and care of wire rope has been put out by the Jones & Laughlin Steel Corp., 311 Ross St., Pittsburgh 30, Pa. Lively cartoon figures make it entertaining as well as informative.

The catalog is divided into five sections: one on the installation and operation of wire rope; another on selecting the correct wire rope for the job; a third which presents a catalog of standard J&L wire-rope construction; a fourth about standard fittings, slings, and splicing service available with J&L wire rope; and finally, general recommendations for ropes in use on standard equipment.

The catalog, which is entitled "Wire Rope Is a Machine", depicts all phases in the right and wrong handling of wire rope. It demonstrates spooling and un-

reeling, lubricating, shifting wear points, and attaching fittings. It also lists completely the sizes and types of wire rope and wire-rope fittings in the Jones

& Laughlin line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 78.

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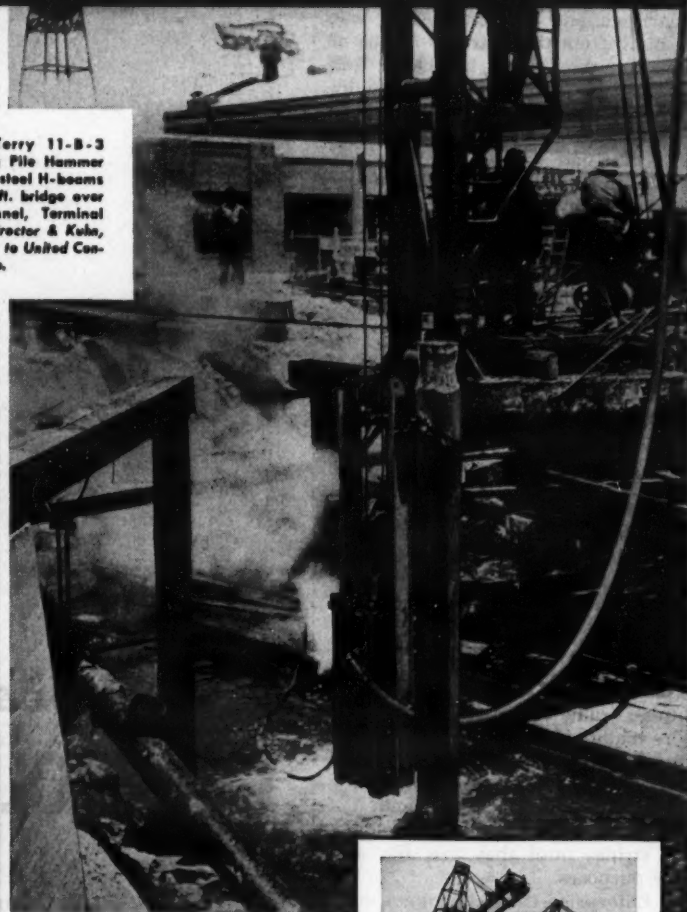


FLINK CO. Dept. S-5 Streator, Ill.

Driving 1170 Steel Piles Under Water



McKiernan-Terry 11-B-3 Double-Acting Pile Hammer driving 85-ft. steel H-beams for the 4,000-ft. bridge over Carriles Channel, Terminal Island, Cal. Proctor & Kuhn, sub-contractors to United Concrete Pipe Corp.



This longest, highest vertical-lift bridge on the Pacific coast is a major traffic link in the Terminal Island Access Freeway, to relieve congestion on outlying highways and to speed traffic to the island Naval Base.

390 steel piles, 85 feet long, had to be driven full length into unstable soil to required elevation at cut-off 12 feet below the surface of the water, in addition to 780 shorter piles for the lift span piers.

McKiernan-Terry Double-Acting Hammers were the first pile hammers developed for underwater driving, and have held a reputation for underwater driving dependability through the years. That is why the 11-B-3 Hammer was chosen for this job.

Whatever the pile-driving problem may be, McKiernan-Terry offers the answer in a pile hammer line that includes 10 standard sizes in Double-Acting Hammers, 5 Single-Acting sizes and 2 Double-Acting Pile Extractors.

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McKiernan-Terry PILE HAMMERS AND EXTRACTORS

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Loss of Profits as Base For Assessment of Damage

THE PROBLEM: If an airport contractor prevented a drainage subcontractor from completing his job, could the subcontractor collect damages based upon a loss of profits?

THE ANSWER: Yes, on proof of facts permitting an approximately accurate computation of the loss. (Haddad v. Western Contracting Co., 76 Fed. Supp. 987, decided by the United States District Court, Northern District of West Virginia.)

In this case an award of \$27,000 damages was set aside, and a new trial was granted on the ground that the evidence produced by the subcontractor was insufficient to sustain an award. The high spots of the court's opinion are as follows:

"About the only evidence offered by plaintiff as to prospective profits was as follows: He was an experienced contractor and took the drainage job for \$151,000, then estimating that he would make about 20 per cent or approximately \$30,000 profit on the job. At the trial he gave it as his opinion that taking into account weather conditions, transportation and labor difficulties, other losses, difficulties, and miscalculations, his profit on the job would have been \$27,000. He also offered in evidence an itemized statement of his expenditures for labor and material while he was on the job, completing about 20 per cent of the drainage contract. . . .

"The general rule now is that where, from the nature or circumstances of the contract, it may be inferred or presumed that the parties to it contemplated that profits would accrue to one of them from performance, and it is reasonably certain that performance of the contract would have that result, the party who is deprived of such profits by a breach of the contract is entitled to recover the amount of his loss so caused, unless such loss is open to the objection of remoteness or uncertainty. Uncertainty as to amount of the damages does not prevent a recovery, if the evidence affords a sufficient basis for estimating their amount in money with reasonable certainty. . . .

"In a case like this where there was only part performance of the contract, profits are prospective and must to some extent be uncertain. Because of the difficulty in proof of the exact amount of damages, plaintiff can not be deprived of all remedy. Absolute certainty of data upon which lost profits are estimated is not required. Too rigid an application of the rules of evidence in such cases would render nugatory the laws designed to protect the innocent. Different circumstances have been allowed to vary the application of such rules in order to make them effective in reaching the ends they were designed to secure. Doubts are generally resolved against the party committing the breach of contract. . . .

"It is sufficient for the plaintiff to show generally the facts which will enable and justify the jury to approximate his profits. It is generally sufficient if there is a certain standard or method by which such profits may be estimated with a fair degree of accuracy. The method here was for the plaintiff to show with a fair degree of accuracy the cost of doing the drainage under the contract, if defendant had done the preliminary grading in accordance with the plans and specifications. The difference between the contract price and the cost of performance would have constituted lost profits. . . . In addition to giving his estimate of profits, the plaintiff should have introduced evidence to show the estimated amount

and cost of material and labor it would take to complete the remaining 80 per cent of the job, if the grading had been done according to the contract, taking into consideration the cost of such items at the time of the alleged breach of contract by defendant, and also any weather, transportation, or other difficulties beyond the control of the defendant.

"There can be no doubt as to the right of plaintiff to recover profits in a case of this kind. But here plaintiff sought to establish the amount of his loss by his opinion of his profits, without giving the facts on which such opinion was founded. This is not a case where plaintiff can establish his profits by the opinion of witnesses, even though they be experts. To hold otherwise would transfer to such witnesses the functions and duty of the jury who are alone given the power of reaching conclusions from given premises. It would make the rights of the parties dependent upon the conjectured and specula-

tive opinion of witnesses, many of whom would not agree."

Prorating Contract Time Under a Partial Shutdown

THE PROBLEM: A Government highway contractor secured a partial shutdown order due to bad weather; it covered all work except excavation. The order set up an inadequate formula for prorating the shutdown time against the contract time for performance. Did the order inadequately extend the contract time and therefore result in collection of excessive liquidated damages from the contractor?

THE ANSWER: Yes, decided the United States Court of Claims. Moreover, the contractor had a meritorious claim for reimbursement, but he had no legal claim in the absence of proof that during unsuitable weather he requested a modification of the shutdown order and that the request was refused. (First-Citizens Bank & Trust Co. v. United States, 76 Fed. Supp. 250.)

The court found that the contractor's failure to complete his contract within the time allowed was attributable to his failure to accomplish enough unclassified excavation during the months of bad weather when all other contract work was suspended. He was able to do only about half of the excavation during the shutdown period that was con-

templated by the shutdown order. If he had done more of it, he could have completed the balance of the work within the contract time that remained after the partial shutdown was terminated.

The contract provided for adjustment of disputes by the contracting officer, subject to appeal to the department head. The Court said that the contractor should have sought adjustment of the terms of the contract under that procedure.

Premiums for Insurance On a Cost-Plus Contract

THE PROBLEM: A Federal cost-plus contract specified that the contractor should be reimbursed for wages paid and "the cost of such bonds and insurance as the contracting officer may approve or require." The officer refused to approve premiums for insurance covering employees other than the cost of a War Department insurance-relief plan. The contractor increased the salaries of employees who rejected that plan, to reimburse them for outside insurance. Was the contractor entitled to reimbursement for the amount of such increase in salaries?

THE ANSWER: No, according to the United States Court of Claims. (Pan American Airways, Inc., v. United States, 81 Fed. Supp. 231.)

(Concluded on next page)

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1955 Lafayette St., Santa Clara, Calif.

Avoid Legal Pitfalls

(Continued from preceding page)

The court said that it was "manifest that plaintiff is seeking to do by indirect means what it was not entitled to do directly . . . under the contract. Although technically its suit is for additional wages paid its employees, a reimbursable item, it is in fact a suit for premiums on insurance which defendant [the Government] expressly refused to pay. Plaintiff cannot do indirectly what the contract expressly prohibited it from doing directly."

Project Engineer's Right To Direct Order of Work

THE PROBLEM: A project engineer required that excavation on a Federal highway job be progressively completed, instead of permitting the contractor to remove all overlying earth before excavating rock. Was the contractor entitled to reimbursement for the rental value of equipment therefore rendered idle at intervals?

THE ANSWER: No, decided the United States Court of Claims. But in a proper case, rental value of a contractor's equipment rendered idle through unjustifiable interference is a proper charge. (First-Citizens Bank & Trust Co. v. United States, 76 Fed. Supp. 250.)

Before the engineer's ruling the contractor had moved a shovel from cut to cut on a 2-mile stretch, leaving underlying rock for later removal. This upset the balance between rock and earth excavation and use of the respective materials in fills and embankments, interfering with use of rock at the base. It also affected drainage and erosion. In addition, it would have entitled the contractor to progress payments disproportionate to actual progress, because it involved unclassified excavation payable at a single unit price regardless of the kind of material removed.

The court found that the engineer's action was justified by provisions of the specifications concerning excavation, and it said: "The duty which this court has many times recognized as resting on the Government's engineer—to abstain from interfering unnecessarily with the contractor's performance of his work—does not preclude the exercise of reasonable judgment on the part of the engineer . . . as to how the work shall be carried on, whenever the contractor may be of the opinion that he can employ a different method in discharging his overall obligation under the contract with no additional cost to the other party, and with some possible saving of expense to himself. The principle mentioned must be given a reasonable interpretation. Its applicability in a given case must rest on the facts as they exist, not on what they might have been. And these facts must be viewed in the light of the respective rights and obligations which the parties have expressly or impliedly reserved to themselves, by their contract."

Incidentally, the court decided that where,

in a case of this kind, the contractor is entitled to reimbursement for the rental value of equipment while it is rendered idle, there should be deducted "an allowance for the absence of wear and tear on the equipment such as would necessarily have been incident to its hire and use on some other work". It was considered that a 10 per cent deduction from rental value would be just under circumstances like those which were involved in this case.

Bidding Specifications As to Source of Supply

THE PROBLEM: Did a city, in inviting bids, have a right to specify that an asphalt-paving contractor's mixing plant must be situated within the city limits?

THE ANSWER: No, decided the New Jersey Supreme Court. (Armstrong v. Board of Commissioners of City of Trenton, 59 Atl. 2d 807.)

The specification was attacked as being arbitrary, discriminatory, and stifling to competition. On behalf of the City it was contended that the requirement was justified as limiting the haul of hot sheet asphalt from the paving plant to the construction site.

Declaring the specification to be void, the court pointed out that although a municipality has considerable discretion in framing municipal construction specifications, a specification must be reasonable. Said the court:

"There is no question but that the 'sole purpose' [of the specification], in the judgment of the municipality, is in the interests of the taxpayer, but the means that the governing body adopted to accomplish that purpose are faulty. The test is the reasonableness of the specification, and reasonableness is to be determined by the actual effect, not by the intended effect that existed in the minds of the framers. To illustrate, we cite a hypothetical situation in which the city advertises for bids on a paving job. A contractor, whose plant is located 1 mile outside of the city limits and who is the low bidder on a job located within 2 miles of his plant, is confronted with the bid of another contractor whose plant is located within the city limits but whose bid is higher and whose plant is farther from the site of the work. Under the specification as written, the municipality would have to award the contract to the higher of the two bidders because his bid was the only one that met the requirement of a plant located within the municipality. The result would be the exclusion of a lower bid to the detriment of the taxpayer. The requirement that the site of the bidder's plant be within the city limits is unreasonable because the mere fact of location of the plant on one side or the other of the geographical boundary is not a true test, since it bears no relation to the purpose that the governing body sought to accomplish."

Contractor Fails to Give All the Data With His Bill

THE PROBLEM: On a Government highway project when a jacket wall had been completed, the project engineer called upon the subcontractor who constructed it to submit a bill of the cost. The subcontractor's repre-

sentative submitted a bill but he did not disclose measurements of the wall then or later. The first engineer's measurement was grossly inaccurate. But a new measurement was taken by a second engineer who replaced the first engineer. Did the contracting officer and road commissioner properly rely upon the second engineer's measurement?

THE ANSWER: Yes, decided the United States Court of Claims. (Asheville Contracting Co. v. United States, 76 Fed. Supp. 707.) The court said:

"It is significant that on . . . final appeal" to the department head "plaintiff's subcon-

tractor submitted for the first time certain figures which were supposed to have been made at the time the wall was laid. It appears to us that if the plaintiff actually had these figures in its possession, it was under an obligation to disclose them at the time it submitted its original bill in response to the request of the proper engineer." Since plaintiff failed to do so, and since he waited until after one measurement had been made and a remeasurement was about to be made, "the head of the department did not act arbitrarily in disregarding these figures and relying upon the second measurement made by his representatives."



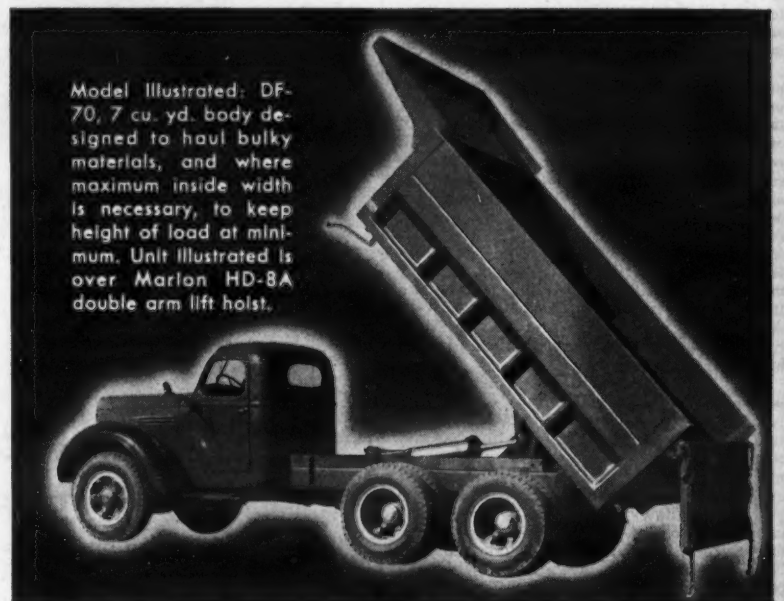
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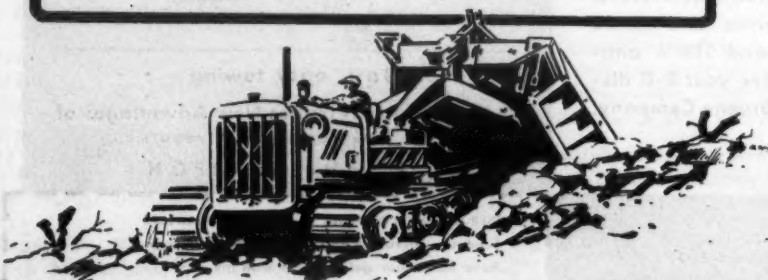
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Motor Grader Is Powered By Gas or Diesel Engine

A new catalog describing the Models 8 and 8-D motor graders has been prepared by the American Road Equipment Co., Omaha, Nebr. The Model No. 8 is powered by a 40-hp gasoline engine; the 8-D, by a 40-hp diesel. Catalog No. 101 features on-the-job photographs of the grader, as well as sectional views of its component parts.

A bird's-eye view of the grader shows its frame construction and the relative position of the various controls and parts. This photograph is keyed to short text descriptions of the various parts. The catalog also contains a side view of the grader indicating its general size and listing seven features.

Several types of front-end attach-

ments are available for use with the machine, and these are described in detail. They include a V-type snow plow, front-end bucket, reversible snow plow, bulldozer, and the Hi-Lift loader.

Copies of this literature may be obtained from the American-Coleman Co., 340-41 WOW Bldg., Omaha, Nebr. Or use the enclosed Request Card. Circle No. 65.

Rollers in Two Styles

Pneumatic-tire and sheepfoot rollers are described in two folders issued by the Tampo Mfg. Co., 1146 W. Laurel St., San Antonio, Texas. Bulletin No. R9-13 covers two models of pneumatic-tire rollers; and Bulletin S-347 describes six models of sheepfoot rollers.

Specifications listed for the pneumatic-tire rollers include rolling width,

tires, ballast-box capacity, weight, ground pressures per linear inch, and overall dimensions. Cross-sectional drawings illustrate the construction of the wheel-and-axle assembly and the ball-and-socket assembly, and photographs show other construction features.

The Tampo sheepfoot rollers are made in single and double-drum units in three sizes—for standard, heavy, or extra-heavy duty. Bulletin S-347 uses large-size drawings to show the features of the axle and housing, the heavy-duty cleaners, and the action of the tamping feet. Specifications cover compaction pressures per foot, number of feet per drum, dimensions, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For the bulletin on the pneumatic-tire rollers, circle

No. 90; for the bulletin on the sheepfoot rollers, circle No. 91.


Keystone to Manufacture 25-Ton Crane Carriages

A division which will make construction machinery has been formed by the Keystone Driller Co., manufacturer of blast-hole drilling and heavy-excavating equipment. Located at 419 Wood St., Pittsburgh, Pa., it will be known as the Equipment Division. Robert H. Fox & Associates of Van Nuys, Calif., has been selected to direct the engineering and marketing of this line.

Keystone's first offering will be a 15 to 25-ton-capacity self-propelled one-man crane carriage, or wagon, on pneumatic tires, for use with all makes of cranes.

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All-Wheel-Drive

New Crushing Units Feature Portability

New-model portable primary and secondary crushing plants are announced by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. The primary plant, designated the No. 153-PR, has a 3042 overhead eccentric jaw crusher with a 42-inch x 14-foot 3-chain apron feeder. It is mounted on a 3-axle chassis equipped with twelve 12:00 x 20 pneumatic tires. A 30-inch x 25-foot built-in conveyor delivers the crushed material over the front end of the plant.

Overall length of the plant is 40 feet 6 inches. Weight without the power unit is approximately 79,000 pounds. Power required for operation is 125 continuous horsepower. The feeder can be raised or lowered by means of two hydraulic rams actuated by a Blackhawk pump. Standard equipment includes a bolster for the front wheels; this can be removed to permit the use of a semi-trailer hitch for moving. Hydraulic

brakes on the four rear wheels are optional.

The secondary crusher, designated the No. 4309, consists of a triple-roll crusher with a feed hopper and delivery conveyor mounted on a chassis equipped with pneumatic tires. The crusher size is 40 x 22. The triple rolls are designed to give a double pass of the material, thereby increasing the stage of reduction possible. The delivery conveyor is 30 inches in width and 20 feet long.

Crushed material is fed into trucks over the front end of the plant. An equalizer is set between the two rear axles. Standard tire size is 10:00 x 20, but, where desired, the rear wheels can be equipped with eight 9:00 x 20 tires, dual-mounted. Brakes can be furnished with mechanical, vacuum, or air control. The front bolster is removable to allow for semi-trailer hitch.

The triple-roll crusher features a positive gear drive using chrome-molybdenum star gears which are said to provide tooth contact at any adjust-

ment of the rolls. Roll wheels are cast manganese steel to resist abrasion and uneven wear. Alloy-steel safety springs are designed to guard against damage by tramp iron or other non-crushable substances. The plant is 30 feet 9 inches long and weighs approximately 40,000 pounds. It requires a power plant with a continuous 110 to 125-hp rating.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 86.

New Air Compressor

A gasoline-powered air compressor is announced by the O. K. Clutch & Machinery Co., Columbia, Pa. It has a capacity of 60 cubic feet of free air and is available on skid or trailer mounting. Capacity of the air tank furnished with the compressor is 4 cubic feet, although an extra-large air receiver is available as optional equipment.

As a special feature, the SS60 compressor uses a Ford engine and standard automotive parts in order to elimi-

nate delay in repairs and to keep maintenance costs down. The compressor is water-jacketed to protect it against overheating. It weighs 950 pounds with the skid mounting, and 1,100 pounds with the trailer mounting.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 93.

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A Section of U. S. 6 Paved With Concrete

To Save Time and Money, Large-Diameter R-C Pipe Replaces Many Bridges On 7-Mile Job

THE Ohio Department of Highways has reconstructed a 7.68-mile section of U. S. 6 in Williams County, in the northwest corner of the state, with a 22-foot reinforced-concrete pavement. The project involved shifting the existing Federal route, between Bryan on the east and Edgerton on the west, slightly southward to where State Route 384 was previously located. U. S. 6 now replaces State Route 384 over this stretch, while the former U. S. 6 to the north is now Ohio 192. A contract for the improvement was awarded by the Department of Highways to the Pierce Construction Co. of Toledo, Ohio, on its bid price of \$717,123.64. Work got under way in September, 1947, and was completed in September, 1948.

At the west end, the job started at the east side of the bridge spanning the St. Joseph River, just east of Edgerton. It continued eastward to its intersection with State Routes 384 and 2. The latter is also designated U. S. 6 for the remaining 4 miles into Bryan. State Route 384 continues due east for 16.5 miles until it again meets U. S. 6.

Besides the concrete paving on U. S. 6, the contract also included 755 feet of new concrete pavement on Route 384 at the intersection, and 860 feet on Route 2 and U. S. 6 at the same point. These other two stretches of adjoining concrete are likewise 22 feet in width. Old Route 384 was a 16-foot macadam pavement with a surface treatment that was rough and uneven, besides being too narrow for the volume of east-west traffic it carries.

Pipe for Bridges

Rooters ripped out the old macadam pavement, and during the winter of 1947-48 many of the old bridges along the route were removed and replaced with large-diameter reinforced-concrete pipe culverts. By substituting pipe for box culverts, or other poured concrete structures, time was saved and

the cost of the drainage item was cut an estimated 40 per cent. Engineering and inspection were reduced with pipe work, and since the job required no form building by carpenters, the need for skilled labor was practically eliminated. Only a foreman and crane operator were required in the skilled capacity for setting pipe. The rest of the work was handled by unskilled labor.

Lock Joint pipe for the job was supplied by the Toledo Concrete Pipe Co. in sizes up to 108-inch diameter. For the 96-inch and 108-inch sizes, the pipe came in 5-foot lengths; below that, the pipe lengths were 4 feet. The joints were sealed with a cement mortar of two parts of sand and one part of cement; the mortar was applied on the



C. & E. M. Photo

With Heltzel forms set for the concrete-paving project on U. S. 6 near Edgerton, Ohio, a Buckeye Pinegrader removes surplus material.

outside of the pipe for the top half, and on the inside for the lower half. When two parallel lengths of pipe were used for a drainage structure, a space of 2 feet was left between them so that

there would be enough room for compacting the backfill.

Some of the structures replaced with pipe included a 7-foot span for which

(Continued on next page)

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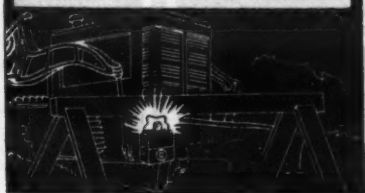
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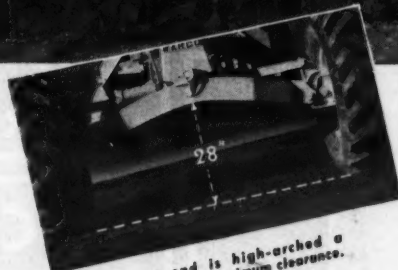


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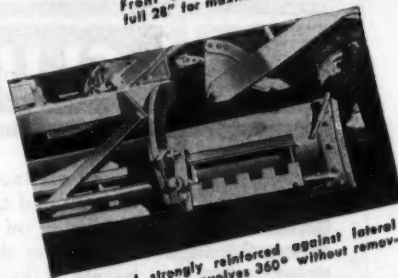
Night wrecks and accidents caused by hazards and barricades can be averted by warning lights and emergency flares. There are a thousand such uses for the Big Beam Electric Flare with red Fresnel lens. Dependable in any weather, set or hang anywhere in any position, knocking over will not interfere with its operation. A flip of the switch gives the choice of either a steady or a flashing flare. Interchangeable clear Fresnel lens converts it to a regular lantern. As easily serviced as a flashlight.

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All controls in front of cab, within easy reach of operator.



C. & E. M. Photos

A concrete batch is discharged between forms in front of a Blaw-Knox paddle-type spreader (left) which is followed by a Jaeger-Lakewood double-screed finisher (above) on the U. S. 6 concrete-paving project near Edgerton, Ohio.

A Section of U. S. 6 Paved With Concrete

(Continued from preceding page)

two 66-inch pipes were laid; a 10-foot span with two 84-inch pipes; another 10-foot span with two 72-inch pipes; a 12-foot span with two 96-inch pipes; a 13-foot span with two 96-inch pipes; and a 17-foot span with two 108-inch pipes. All these multiple-pipe culverts replaced concrete structures that were too narrow for the new width of road-bed.

Grading

Only some slight changes were necessary in the alignment of the old road. Some progress on the grading was made during the late autumn of 1947, but by November the work slackened off because of severe winter conditions and did not pick up again until the following April. Despite a wet spring, the rough grading was completed by the middle of June. No rock was encountered; the material throughout was chiefly a yellow clay. The dirt-moving was sublet to the Heavy Duty Construction Co. of Indianapolis, Ind.

In this gently rolling country, the maximum depth of cuts and fills was around 8 feet. At the west end of the job about 18,000 yards of material was wasted. The contractor decided not to haul it all the way to the eastern end of the project where fill was needed.

Instead, a roadside borrow pit was opened at the east end to obtain the required yardage. The dirt was moved chiefly with five 15 to 18-yard Tournapulls, helped in loading by two Allis-Chalmers HD-14 push tractors. The average haul was 1,800 feet, but in some places dirt was moved as much as a mile. It was spread in 8-inch lifts by an International TD-18 and a Caterpillar D7 tractor-dozzer, and compacted by dual sheepsfoot rollers pulled by an HD-7 tractor. The minimum density obtained was 98 per cent of Proctor.

On top of the subgrade, for the full length of the project, a 12-inch blanket course of mixed sand and gravel was laid to a width of 26 feet 2 inches. An excellent grade of material, predominantly sand, was obtained from a single pit near the west end of the job. A P&H 3/4-yard shovel worked the pit, loading to a fleet of up to fifteen 5-yard trucks; the average haul was 6 miles. The blanket course was spread in a single 12-inch lift by a D4 dozer; four Caterpillar graders were also on the job and used in this operation. The material was well saturated with water from two 1,000-gallon tank trucks, and compacted by a Huber 10-ton 3-wheel roller.

Running the full length of the job, and 18 inches off each edge of pavement, is a line of 6-inch tile underdrain. It averages about 1 foot 9 inches in depth below the blanket course. At

(Continued on next page)

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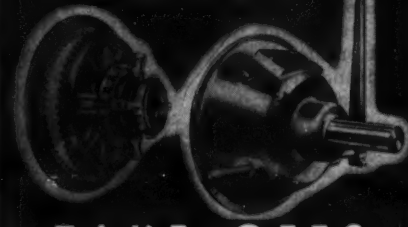
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from 800 to 1,000-foot intervals, the line has an outlet, also of 6-inch tile, into a surface ditch or catch basin. On each side of the 22-foot concrete pavement of 9-inch uniform depth are 10-foot shoulders. The pavement has a 2 1/4-inch center crown, while the shoulders slope at the rate of 1 inch to the foot. Side slopes are 4 to 1 or 3 to 1, and the entire area from the edge of pavement to the outer edges of the slopes is seeded with grass.

Concrete Batch Plant

A concrete batch plant was set up only 1,500 feet from the west end of the job across the St. Joseph River in Edgerton, on a siding of the New York Central Railroad. Two sizes of gravel, No. 3 and No. 4, were used in the mix. The larger size, No. 3, was supplied by the Stonestreet Gravel Co. of Angola, Ind., and delivered to the job by truck after a 28-mile haul. Sand and the No. 4 gravel came 14 miles, also by truck, from Stonestreet & Burtzner Bros. Gravel Co. of Waterloo, Ind. Bulk cement, with Vinsol resin air-entraining agent, was shipped by rail in cars from the Columbia Cement Co. at Zanesville, Ohio.

Each of the three grades of aggregate was stored in a separate bin, lined up in a row about 75 feet apart. Wooden barricades separated the different aggregates on the ground. A D8 dozed the material up into piles where an Osgood crane, with a 50-foot boom and an Owen 1-yard clamshell bucket, picked it up and loaded the bins. First in line, in order of loading for the batch trucks, was a Blaw-Knox 80-ton bin containing the No. 3 gravel; next came the same type of bin with No. 4 gravel; then a Butler 30-ton sand bin; and finally, about 1,000 feet farther on, a Blaw-Knox 300-barrel cement bin which was loaded from the cars by a worm gear and enclosed elevator.

As many as 12 trucks, holding two batches each, were engaged from the R. T. Brower Co. of Pierceton, Ind.; to haul batches. They drove under all four bins to load up in quick order. The cement was carried in separate metal containers which were kept closed until the batch was being unloaded.

The Mix

The weights of a typical 9-bag batch were as follows:

Cement—9 bags	846 lbs.
Sand	1,440 lbs.
No. 3 gravel	1,791 lbs.
No. 4 gravel	1,188 lbs.
Water—41 gals.	341 lbs.
Total	5,606 lbs.

The gradation of the aggregate, together with that of the blanket-course material, follows:

Sieve Size	Per Cent Passing			
	No. 3 Gravel	No. 4 Gravel	Sand	Blanket Course
2-inch	100	....	....	....
1 1/2-inch	80-100	....	....	....
1-inch	20-60	100	....	....
3/4-inch	0-20	80-100	100	....
1/2-inch	....	20-60	....	99
3/8-inch	0-5	5-30	100	96
No. 4	....	0-5	95-100	94
No. 8	....	....	70-95	....
No. 10	....	....	....	88
No. 16	....	....	45-80	....
No. 30	....	....	25-60	....
No. 40	....	....	....	26
No. 50	....	....	10-30	....
No. 100	....	....	1-10	10
No. 200	....	....	....	3

The water-cement ratio was 5.3 gallons to the bag, with a 2 to 3-inch slump. For 1 yard of concrete, 6 1/2 bags of cement were required; a 9-bag batch yielded 37.38 cubic feet. As the air-entraining agent put in the cement at the mill resulted in only about 3 per cent of air in the mix, additional Vinsol resin was put into each batch at the paver. This increased the amount of entrained air to from 3 1/2 to 4 1/2 per cent. A solution was made up containing 8.4 pounds of Vinsol resin and 1.34 pounds of lye to a 50-gallon drum of water. A boy at the paver added a quart of this solution to each 9-bag batch as it was dumped into the skip. Water for the mix was pumped from

the St. Joseph River and hauled to the paver in two tank trucks holding 1,200 and 900 gallons each. Batches were mixed a total of 1 1/2 minutes in a Ransome 34-E dual-drum paver equipped with a 35-foot boom.

Preparations for Paving

Before paving started, 12,000 tons of sand and 8,000 tons each of No. 3 and No. 4 gravel were stockpiled at the batch plant. Once the concreting got under way, more aggregate was continuously hauled in so that an adequate supply would always be on hand. Steel mesh and dowel reinforcing, together with the expansion and contraction-joint assemblies, were likewise stockpiled on the job. They were supplied by the Bethlehem Steel Co. from its plant at Youngstown, Ohio.

With the blanket course serving as a foundation for the concrete pavement, Heltzel steel forms were driven by hand in 11-foot lanes for laying half the pavement width at a time. With 8,000 feet of forms on the job, the usual procedure was to keep around 1,000 feet

(Continued on next page)

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THE MOTO-PAVER A self-contained, self-propelled machine which accomplishes the complete mixing and laying job in one continuous operation, using gravel, stone or slag aggregates and most types of emulsions, asphalts and tars. Particularly adapted for resurfacing jobs on county roads and city streets. Also available in a heavy-duty model for rugged conditions in hilly and mountainous territory.

Although the Hetherington & Berner Model PE is a sectional type plant and can therefore be moved, it retains all the features of a stationary plant that make for dependable and efficient production.

PE plants are electrically driven. All motors and controls are furnished and installed, and the plants are completely wired at the factory before shipment. Optional with this type of plant is equipment for steam dispersion, fugitive dust collection, low pressure oil burning and dust handling.

Write for Bulletin P-46 which gives specifications and complete information.

HETHERINGTON & BERNER INC.

731 Kentucky Ave., Indianapolis 7, Ind.



C. & E. M. Photos

Also on the Pierce Construction Co. job, Tru-Cure compound is sprayed on the concrete by a machine powered by a Briggs & Stratton gasoline engine (above) and Careylastic filler for the joints is drawn off in a bucket from a White heater (right).

A Section of U. S. 6 Paved With Concrete

(Continued from preceding page)

of forms set ahead of the paver. The graders had shaped the blanket course which was given another rolling by a Galion 10-ton 3-wheel roller. Then a Buckeye Finegrader, moving along on cables fastened to the forms ahead, removed surplus material between the forms, tossing the dirt out to the sides. A scratch template was then pulled along to check the grade for a 9-inch uniform depth.

The forms along the center of the road were fitted out with a key, 2 inches high x 1 inch wide, at the midpoint. The keyways came in metal strips 5 feet long, and were fastened to the forms by bolts, two bolts to each 5-foot length. The two 11-foot lanes were bonded together by this key and by 48 x 1/2-inch tie bars set on 5-foot centers halfway down in the slab. The tie bars were bent so that half their length folded along within the keyway as one lane was being poured. Then, when the forms were removed, the rods were straightened out before the adjoining lane was paved.

Expansion joints were placed at 600-foot intervals, with contraction joints every 40 feet. Both types of joints used the same assembly, which consisted of a cage supporting 15 x 1-inch dowels on 15-inch centers across the slab at the mid-depth level. At the expansion joint the dowels were capped at one end, and they passed through a 1-inch thickness of premolded fiber material impregnated with bitumen. The top of the expansion material was an inch below the surface of the concrete.

Paving Operations

On this job the paver worked outside the forms on the wide shoulder, with the water trucks in front and hooked to the paver with a connecting hose. Batch trucks backed down the shoulder and dumped their contents into the skip, the air-entraining admixture was added, and the batches were mixed. The concrete was discharged between the oiled forms in front of a Blaw-Knox paddle-type spreader which struck it off 2 inches below the top of the forms. The mesh reinforcing was laid on top of this first lift, more concrete was added, and the spreader made another pass to level off the concrete in a line with the top of the forms. At the rear the spreader carried a vibrator to vibrate the concrete along the forms.

Behind the spreader came a Jaeger-Lakewood double-screed finisher, and from the back of it steel strips were inserted into the concrete at the contraction joints. These strips were 2 3/4 inches deep x 1/4 inch wide x 11 feet long, and extended the full width of the slab. The expansion joints had been capped with a metal channel to keep the slot free of concrete. After these strips were embedded in the surface of the soft concrete, the finishers carefully checked the paving with a 10-foot metal straight-edge. This was followed by floating from each side with a long-handled float made from a 3-foot section of 1 x 6.

Surface laitance was removed with a burlap drag. Then, as the concrete acquired its initial set, the finishers working from bridges removed the caps from the expansion joints and the metal strips from the contraction joints. The joints were then edged with a 1/4-inch-



radius edging tool. The concrete was cured with Tru-Cure compound ap-

plied to the concrete by a spraying machine. (Concluded on next page)

CUMMER ASPHALT PLANTS

COMPLETE PLANTS
FROM 45 TO 100 TONS
PER HOUR

PROMPT SHIPMENT ON
ALL SIZES

FEEDERS, STORAGE BINS
PUMPS - TIMERS
AND OTHER UNITS AS
REQUESTED

LITERATURE UPON REQUEST

CUMMER NEW PORTABLE DRYER

—45 TO 55 TONS PER HOUR HOT MIX—

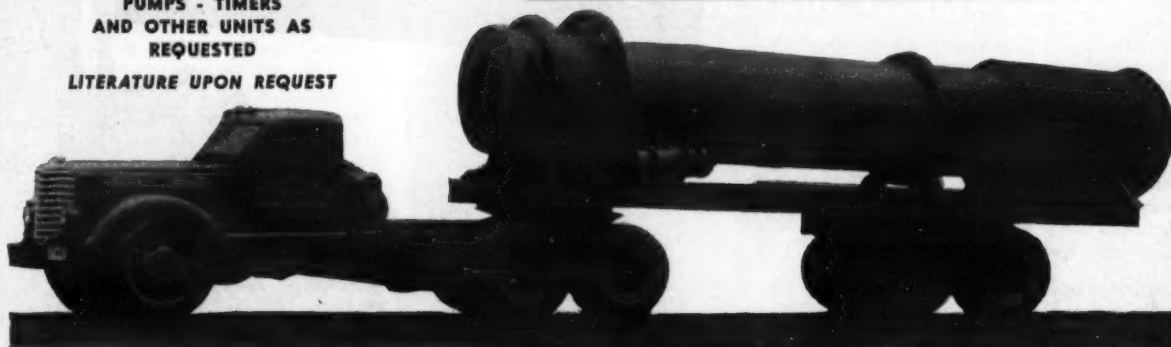
FURNISHED COMPLETE WITH INDIVIDUAL MOTOR DRIVES, AND WITH ENCLOSED COLD ELEVATOR, FAN AND BURNERS (EITHER HIGH OR LOW PRESSURE).

CAN BE FURNISHED WITHOUT WHEELS AND AXLES.

COMPLETE TOWER UNITS, VIBRATING SCREENS, HOT ELEVATOR AND BINS, FURNISHED WITH DRYER IF DESIRED.

LARGER SIZES 80 TO 100 TONS PER HOUR (COMPLETE DRYING AND MIXING UNITS) ALSO AVAILABLE

THE F. D. CUMMER & SON COMPANY
BUILDER OF FINE ASPHALT PLANTS
CLEVELAND 15, OHIO USA



● NO SHIFTING OF GEARS
fully automatic, free-wheeling gear box

● INSTANTANEOUS SHUT-OFF
a one lever operation

● POWDER FINE CARPET SPREAD TO A THREE-
INCH DEPTH
controlled by Micrometer Depth Adjustment

● NO CLOGGING
oversize particles work through Flexible Keyboard without emptying hopper

● SPREAD HEAVY ON ONE SIDE . . . LIGHT ON
THE OTHER
utilize Taper Attachment for this effect

● TRUCK HITCHES TO SPREADER FROM ANY
ANGLE
positive Locking Automatic Hitch

GOOD ROADS MACHINERY CORP.

MINERVA, OHIO

chine powered by a Briggs & Stratton gas engine. The spraying unit was pushed on rails across the bridge spanning a single lane.

Pouring the Joints

The day following a pour the forms were removed and the joints cleaned out. This was generally done by chiseling out an opening at the ends of the joints where they had butted up against the forms. A compressed-air hose then blew out all dirt and foreign material leaving the open crack clean and dry. Air was furnished by a Le Roi 105-cfm Tractair air compressor. Next, a little clay was pressed up against the sides of the concrete at the joints to retain the joint filler when it was poured in.

Joints were poured with Careylastic which was heated to around 400 degrees F in a White heater. Two torches heated the oil bath in the tank which, in turn, kept the rubber joint filler at the required temperature. When the 400-degree mark was reached, one of the torches was removed, for the other was sufficient to maintain the desired heat. Before the pouring bucket was filled at the heater, it was thoroughly heated by the torch that had been taken from the heater. At the expansion joints the slot filled was 1 inch deep and 1 inch wide, while the contraction joints were in the shape of a V, 1½ inches deep, ¼ inch wide at the bottom, and ¾ inch wide at the top.

Paving operations started at the west end of the job and worked towards the east away from the batch plant, first on the east-bound lane and then on the west-bound. The average production was 1,800 feet of single 11-foot lane in a 10-hour working day. At the start of the job a long detour was necessary to the north in order to get across the St. Joseph River. After the first 2 miles were in, traffic used what is now State Route 192 instead of U. S. 6.

Quantities and Personnel

The major items on this 7.68-mile concrete-paving project included:

Roadway excavation	150,000 cu. yds.
Tile underdrain, 8, 10, and 12-inch	14,485 lin. ft.
Tile underdrain, 6-inch	80,016 lin. ft.
Blanket course	41,155 cu. yds.
Reinforced-concrete pavement, 9-inch	103,385 sq. yds.
Reinforced-concrete culvert pipe, 12 to 30-inch	1,258 lin. ft.
Reinforced-concrete culvert pipe, 36 to 108-inch	1,484 lin. ft.

The Pierce Construction Co. employed an average force of 50 on the project under the supervision of Richard Pierce, Superintendent.

For the Ohio Department of Highways, K. E. Grose was Project Engineer, and W. Wolf was Concrete Technician. The Department is headed by Theodore J. Kauer, Director, with Frank M. Williams, Assistant Director and Chief Engineer. Homer E. Anderson is Chief Engineer of Construction. The project was located in the Toledo District of which W. B. Robison is Division Deputy Director.

Unitized Shaft Seal Is Feature of Pump

A line of self-priming centrifugal pumps is manufactured by the Rice Pump & Machine Co., Division of the Milwaukee Chaplet & Mfg. Co., 1049 S. 40th St., Milwaukee 4, Wis. The Rice Model 7M pump has a capacity of 7,000 gallons per hour; the 10M has a capacity of 10,000 gph. Both have 2-inch suction and discharge openings.

The Rice pumps feature a self-lubricated shaft seal which is entirely enclosed in a welded pressed-steel cartridge. The fact that this seal can be replaced as a unit, the manufacturer points out, cuts down on time and labor involved in its replacement.

Other features claimed for the Rice pumps include fully automatic priming after the pump is put into service; direct line flow of water, or other liquid,

through the suction opening to the impeller; a built-in suction check valve designed to hold liquid in the pump for re-priming and to eliminate the need for a foot valve in the hose; and a non-clogging impeller and wear plate, both of which are designed for easy replacement.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 127.

State Surveys Its Aggregate Deposits

A statewide investigation of stone, sand, and gravel deposits is under way in the Commonwealth State of Virginia. Launched by the State Highway Department, its purpose is to determine the location, availability, and characteristics of all native road-building materials in the state. Over a period of years, the investigation will include an acre-by-acre study of virtually the entire state. Materials of potential value for road construction and maintenance purposes will be indexed as to location, type, tonnage, accessibility, and specifications.

In order to build up the information as quickly as possible, field engineers will first catalog the deposits already known to exist. Studies are being made along road cuts, streambeds, hillsides, and other areas where the aggregates are exposed. After locating the deposits on reference maps, the investigators make tentative identification, estimate the tonnage, study the possibility of access, and obtain samples. The samples are sent to testing laboratories, where they are checked against department specifications. Master maps locate the site of every deposit.

After the exposed deposits are indexed and thoroughly tested, investigators will probe the subsoil to ferret out new deposits. It is expected that information gathered during the survey will bring a substantial saving in time and money. As highway maintenance and construction projects are put under way in various sections of the state, information concerning near-by aggregate deposits will be immediately available to road-building contractors as well as state forces. This will help them to reduce transportation costs and speed up their work.

The project is under the direct supervision of Shreve Clark, Testing En-

gineer for the Department. Materials engineers in each of the eight highway-construction districts are handling the field investigations. W. T. Parrott, Geologist for the Department, is coordinating the field investigations; and C. S. Phillips, D. D. Woodson, and R. G. Bremner are handling the testing.

McGraw Joins Riddell Corp.

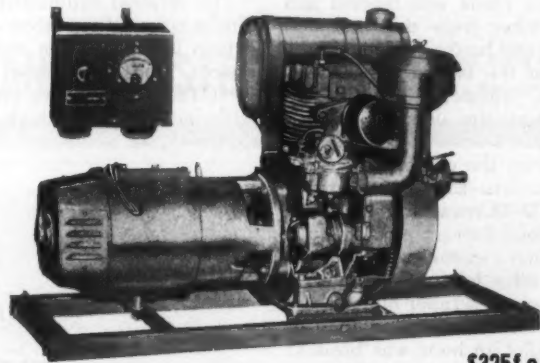
A. William McGraw has been named Sales Promotion Manager of the W. A. Riddell Corp., Bucyrus, Ohio. Mr. McGraw will be in charge of sales for Warco motor graders and Hercules road rollers.

LITTLE GREEN HORNET

3000 WATTS FOR \$325

3 KW Direct Current Gas Engine Driven — Heavy Duty — Generating Sets.

Brand New



\$325 f.o.b. New York

GENERATOR SPECIFICATIONS—Continental, compound wound, ball bearing, 3000 watts, 125 volts DC.

DISTRIBUTION BOX—2-way, equipped with voltmeter and rheostat for accurate voltage regulation.

ENGINE — Wisconsin model AEH, four cycle, air cooled, built-in fuel tank, fly-ball governor, air cleaner and muffler.

CHECK THESE FEATURES—**RHEOSTAT**—for accurate voltage control

FUEL TANK—1½ gallon built-in **HEAVY DUTY** Wisconsin gas engine **PUSH BUTTON** Bendix starter—6 volt

PRICE—only \$325 f.o.b. New York

WILL OPERATE—

- 2—Dado Dappers
- 5—Disc Sanders
- 3—Large Electric Hammers
- 2—¾" Heavy Duty Drills
- 2—12" Electric Saws

Send check or money order for immediate delivery. C.O.D.—25% deposit before shipment.

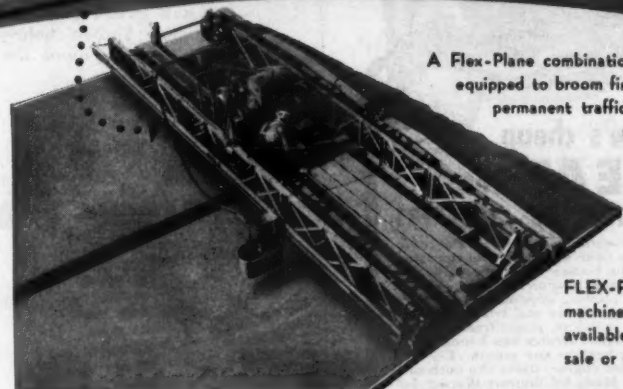
FREE—10 Gallon All Steel Auxiliary Gas Tank with each order.

FACTORY & HOME SUPPLIES Corp.

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MECHANIZE BEHIND THE FINISHER

• With Flex-Plane equipment you can mechanize the entire paving job... the modern high speed Flex-Plane finisher needn't outdistance the miscellaneous "end" jobs. The Flex-Plane mechanical tie-bar and dowel spotter, the vibratory joint machine and the combination spray machine will crowd the fastest paver. The completely automatic combination machine can broom, belt or drag burlap, install permanent traffic lines and spray cure. Don't let outmoded methods retard jobs nor run away with costs. For full information, return the coupon from this ad.



A Flex-Plane combination machine equipped to broom finish, install permanent traffic lines and spray cure.

FLEX-PLANE machines are available for sale or rental.

COMBINATION MACHINE:

- BROOMS, BELTS OR DRAGS BURLAP
- INSTALLS PERMANENT TRAFFIC LINES
- SPRAY CURES

Send me full information on:

- Flex-Plane spray and combination machines.
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Farm-to-Market Road Is Levelled, Graveled

Improvements on a 2-mile stretch of farm-to-market road have been completed by the Highway Commission of Wayne County, Nebr. A mile on each of two section roads was leveled and graveled. Ditches were dug out, and the shoulders and banks graded. At the intersection of the two, a culvert was put in and a compacted dirt fill was built to protect the crossing against run-off water.

The trench for the culvert ditch was dug by a Bucyrus-Erie S-91 scraper pulled by a TD-18 crawler tractor. The corrugated-metal culvert pipe was put in position. Then a motor grader pushed a heavy protective layer of dirt over it, and the tractor and scraper built up the fill at the intersection. An average of 180 yards of dirt an hour was brought to the intersection and placed. Dirt was borrowed from a ditch on an adjoining section of road not included in the improvement project.

Compressor Is Driven By Multi-Fuel Engine

An engine-driven 2-stage gas or air compressor is announced by the White-Roth Machine Corp., Lorain, Ohio. Known as the Lorain Model O-10TS, it is direct-connected to a Lorain Model O multi-fuel engine. The engine can be equipped with a Bosch fuel pump for operation on diesel oil, or with an Ensign carburetor and Bosch magneto for operation on natural gas or butane.

The compressor cylinders have top suction and bottom discharge for gas condensates, and a circulating-water cooling system. The engine power cylinder is cooled by circulating water or by a condenser-type system incorporating a belt-driven fan. A large-capacity

At left, tractor operator John Nedel of Winside, Nebr., scoops out the location of a new culvert at the crossing of two section roads in Wayne County. Next, County Commissioner W. I. Misfeldt supervises as the culvert is tamped in place. And finally, the Bucyrus-Erie S-91 scraper and TD-18 tractor build up the fill over the culvert.

oil reservoir with combination splash and force feed is said to provide adequate lubrication.

The optional equipment available includes air-starting valves or a gasoline-driven Lorain friction starter, flywheel guards, and steel base. The Model O-10TS is 149 inches long, 39 inches wide, and 62 inches high.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 57.

Syntron Makes Changes

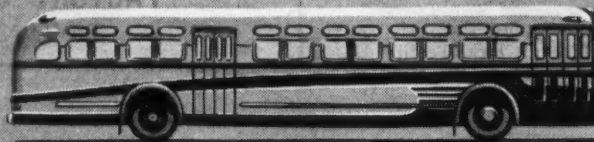
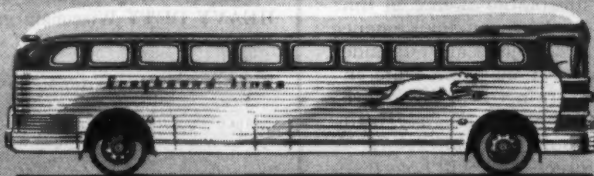
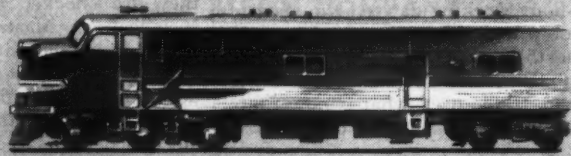
The establishment of several new district sales offices has been announced by the Syntron Co., along with several

promotions of sales personnel. W. C. Leasure is District Sales Manager in charge of the new Houston, Texas, office. Nelson C. DeVilling is District Sales Manager of the new Dallas office. Dick McHale is District Sales Manager of the Los Angeles office. James B. Barth succeeds Mr. DeVilling on the staff of the Pittsburgh sales force; and G. R. Stocum takes over Mr. McHale's duties in the Chicago sales office. D. E. Nugent has taken over power-tool sales in the Kansas City, Mo., office.

By Road and by Rail

THE TREND IS TO DIESEL

DIESEL LOCOMOTIVES—In 1938, there were 262 mainline Diesel locomotives. In 1948, the number was in excess of 5,000. Seven out of ten Diesel locomotives in passenger service, and three out of four hauling the new fast freights, bear the General Motors nameplate.*



DIESEL COACHES—In 1938, less than 200 Diesel coaches were in operation. By 1948, the number had multiplied to over 18,000. GMC production has accounted for more than 90 per cent of the total. Latest examples of GMC's Diesel coaches are the streamlined Greyhound inter-city coach and the long, low 55-passenger transit model, shown at left.*

DIESEL TRUCKS—In 1938, there were less than 500 Diesel trucks. By 1948, the number had jumped to 12,000. In recent months, GMC has produced nearly 30 per cent of the total. Shown below is a GMC 200-horsepower Diesel tractor.*



GMC Diesel trucks are powered by engines of the same basic design as the Diesel locomotives which pull many of the finest, fastest trains.

This advanced and exclusive GM 2-cycle design cuts Diesel weight without sacrifice of power, thus permitting greater payloads. It also provides outstanding fuel economy, low maintenance costs, exceptional dependability and long life.

GMCs are the only Diesel trucks offering a choice of four- and six-cylinder engines . . . specially engineered Diesel chassis . . . a selection of eight series of models. And, more important, GMC has had unequalled experience in equipping vehicles with these modern, time and money saving power plants.

GMC TRUCK & COACH DIVISION
GENERAL MOTORS



*Estimated figures based on latest available information



Here's cheap HEAT for CONTRACTORS • TRUCKERS

Winter work revolutionized. Portable Heater (war surplus) heats construction jobs, houses—at low cost! 100,000 B.T.U.'s per hour on 1½ gal. gas. Dries paint, plaster, concrete. Pre-heats engines, tractors and trucks. Thaws engine radiators, pipes, frozen equipment, tanks. Heater has 3 long ducts to pipe heat to any points. 1½ h.p. air-cooled engine, starts like outboard motor. Made by Stewart-Warner for wartime use. Reconditioned, guaranteed in good working condition. Shipped by fast freight or express. Order today . . . supply is limited. Enclose check or money order. Replacement parts available. Brand new heaters available at \$295.00 for delivery in Eastern Seaboard States from New England warehouse. 5% discount on lots of 10 or more.

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Power Plant Designed With a Welded Frame

Designers Note Savings in Cost Of Construction. Improved Use of Natural Light and Heat, and More Efficient Handling of Equipment

THE construction of a hydroelectric power-plant building has usually been associated with the construction of a large dam. And when the dam is a large concrete structure, the power-plant building is also constructed of concrete. For this reason, little consideration has been given, even in building "run-of-the-river" plants, to the use of other forms of construction combined with a variety of new materials.

A paper dealing with the design of a hydroelectric plant using a light welded-steel rigid-frame superstructure was entered in the 1948 James F. Lincoln Foundation "Design for Progress" Program. Its authors are Owren J. Aftreth and Anthony J. Perry, both of whom were formerly with the Design Office of the U.S. Bureau of Reclamation in Denver, Colo.

The paper compares the cost of building a welded-steel structure, as designed, with the cost of building a similar structure of reinforced concrete. For the purposes of the comparison, a plant being constructed of reinforced concrete was redesigned with a welded-steel frame. The plant the authors chose houses three units and has a total capacity of 50,000 kw. According to the paper, the use of the welded structural-steel rigid-frame construction would result in a monetary savings and would allow faster construction, better use of natural light and heat, more efficient handling of heavy machinery and equipment, and earlier installation of revenue-producing generators and turbines.

Description of the New Design

Hydroelectric-plant design, the authors point out, usually calls for a superstructure of reinforced concrete in which the house crane is supported on a heavy crane beam carried on individual columns. Because these columns are called upon to support the crane, resist crane thrust, and act as the building column, the resulting column de-

sign is extremely heavy.

In the welded-steel design, the superstructure serves merely as a protection, or housing, for the machinery. It consists of a series of welded-steel rigid frames, with a wall and roofing of steel, asbestos, or other appropriate materials. The frames can be welded in the field; or they can be shop-welded into sections of suitable size for transportation, and then welded on the job into continuous rigid-steel frames.

Support of Gantry Crane

In the steel-frame design, the house crane is replaced by a gantry crane in order to remove the load from the building columns and to place it on the substructure. With this construction, hangar-type doors can be installed to allow easy passage of the crane, and to permit its use both inside and outside the building. Also, the crane can be installed before the superstructure is built, and the generating units can be installed as soon as it is ready.

(Concluded on next page)

Black-top mixing plant



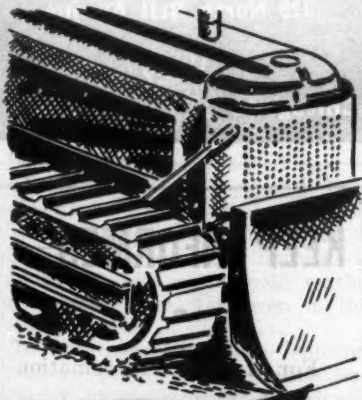
IMMEDIATE DELIVERY from Stock

STANDARD is one of the oldest and largest builders of paving plants—seven sizes to meet all conditions. Used throughout the world. Modern, Unit-built, easy to erect and transport.

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STANDARD STEEL CORP.

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INCREASE TRACTOR Power!

Worn grouser shoes, retipped with BULLDOG TRACTOR GRIP-LUG provide deep-biting traction on any terrain... utilize full engine power... save time, fuel and often contract! Write for complete information, or contact your equipment dealer for details.



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At Last! The 3½ Billion Highway Construction Program Is Well Launched! Are You Ready?

It was a long time in coming, — but today the money is there and it's being spent. Competitive conditions prevail. Awards are going to roadbuilders with the most efficient equipment — and that means Bulk Cement Plants, Aggregate and Cement Batching Plants engineered and built by Butler for your specific work. Have you investigated the new Butler Autobatch Twinbin so vital in solving the problem of irregular cement deliveries? Do you know about the most recent advances in other Butler equipment and in Butler Engineered Design? ... Either or both of the Bulletins listed below will bring you up to date. Send in your request — today...

Autobatch Twinbin Bulletin
Roadbuilders' Batching Plant Bulletin... (Aggregate-Cement)
BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

Power Plant Designed With a Welded Frame

(Continued from preceding page)

The welded-steel frame permits the use of wide expanses of glass surfaces. Combined with proper design of louvers, these provide advantages in the use of natural light and heat. The authors explain that the louvers would be of steel welded in place to the frame of the building at the proper angle to cut out the vertical rays of the sun in the summer, and at the same time allow for maximum use of the horizontal rays of the sun in winter.

Comparison of Cost

In their paper, the authors compare the two types of construction as to estimated cost, including in their tables only those items affected by the change in design. The first table shows the estimated cost using reinforced concrete; the second, using a welded-steel frame. The estimated savings equals \$96,625.

Reinforced-Concrete Superstructure			
Item	Quantity	Unit Price	Cost
Concrete	2,000 cu. yds.	\$90.00	\$180,000
Reinforcing steel	300,000 lbs.	0.10	30,000
Roof steel	200,000 lbs.	0.15	30,000
Windows (glass block)	2,000 sq. ft.	3.50	7,000
Doors	500 sq. ft.	1.75	875
Transfer car	1	2,500.00	2,500
Overhead crane, 80-ton	133,000 lbs.	0.35	46,550
Concrete form lining	45,000 sq. ft.	0.15	6,750
		Total	\$303,675

Welded-Steel Frame			
Item	Quantity	Unit Price	Cost
Welded-steel framing	600,000 lbs.	\$0.15	\$90,000
Roof deck material	12,500 sq. ft.	0.50	6,250
Wall material	17,000 sq. ft.	1.00	17,000
Windows	7,500 sq. ft.	3.50	26,250
Doors	2,600 sq. ft.	1.75	4,550
Gantry crane, 80-ton	180,000 lbs.	0.35	63,000
		Total	\$207,050

The authors explain that the unit prices used were based on recent bids for the particular type of work involved. They include labor and materials, and are for the work completed and in place.

While any number of wall materials could be used to cover the steel frame, the authors feel that for general purposes an insulated steel plate or insulated corrugated steel would provide the most efficient and functional covering, and this was chosen for estimating purposes. Roof decks would be of steel covered with the usual roofing ma-

terials. It was assumed that both the steel deck and the wall-covering materials would be spot-welded to the steel frame, instead of using connectors, in order to reduce weight.

Total Savings

The savings of \$96,625 indicated by the tables represents only the savings in first cost, the authors explain. The actual savings would be greater, owing to financing problems. For one thing, the interest, spread over a period of 50 years or so, would be charged on a lower principal. For another, the installation of the generating units could be scheduled to start as soon as the substructure was ready to receive them, without having to wait for the concrete to cure and strengthen. As a result, the generating units would be ready to deliver power sooner than if a concrete frame were used, and there would be a gross-revenue gain.

Using prevailing rates and charges for electrical service, there would be an estimated savings of \$92,125 in interest payments and \$571,300 in effect of additional revenue. This, coupled with the \$96,625 in original cost, would bring a total saving of \$760,050. This figure does not include the saving which the welded-steel design permits, by

taking advantage of natural heating and lighting, in operation and maintenance of the plant.

Equipment-Handling Advantages

Authors Aftreth and Perry add that distinct equipment-handling advantages are possible through the use of the gantry instead of the overhead crane. With the latter, provision must be made for clearance at the ends of the building, with the result that the crane hook cannot be brought closer than 7 to 10 feet from the wall and valuable handling space is wasted. The location of hatches in the generator floor must be restricted, as well as the space required for the erection of the units.

With the gantry, which can move in and out of the building, these restrictions are eliminated. Work can be done in the open under favorable weather conditions. And the same crane can pick up materials and equipment from the hauling vehicle, and carry them right into the plant. This results in added efficiency in day-to-day operation of the plant, the authors conclude.

The careful selection and use of good lubricants at regular intervals will keep your equipment operating efficiently and economically.



THE BRANICK

"BIG HAND"

Grips Lifts Turns Holds

BY

Finger-Tip Control

Handles truck tires with rim or wheel while removing or mounting.

Shown with truck tire remover on swinging bracket. Ready for instant use.

Manufacturer of Tire Spreaders

BRANICK MANUFACTURING CO., Inc.

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YOU CAN'T KILL TIGERS WITH A Fly Swatter

and you can't economically drive modern piles with anything but a rugged hammer that packs a real wallop.

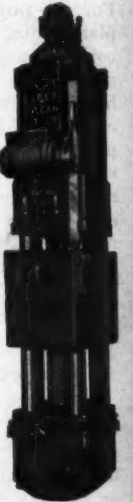
SUPER-VULCAN OPEN-TYPE DIFFERENTIAL-ACTING PILE HAMMERS

18C, 30C, 50C, 80C, 140C and 200C

have the punch necessary to sock the pile down where you want it. Don't worry about the kind of piles the specs call for—wood, heavy concrete, steel beam, or open tube—they all look alike to the Super-VULCAN line.

Six sizes of Super-VULCAN—18C, 30C, 50C, 80C, 140C and 200C—meet every pile driving need. They are fast performers, for you get rapid blows without losing that necessary punch; and they are money savers too, for they use from 25 to 35 per cent less steam.

Remember, too, that the Super-VULCAN open-type fits the same leads and uses the same accessories as the old favorite VULCAN Single-Acting Pile Hammer—they'll work on air too.



Size 18C-30C 50C-140C 200C meet all needs.

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For FAST, SAFE, and ECONOMICAL HANDLING of:

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- Sand
- Gravel
- Lime
- Cement
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- Other Abrasives



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GODFREY TROUGH BELT FEATURES:

- Rugged construction thru-out
- Zerk Lubrication System
- Swivel Wheels
- Belt Alignment Rollers
- Large Wheels (42" x 6")
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- Adjustable Screen-Chute

BELT WIDTHS:

16" - 18" - 24"
4 ply, 28-ounce Duck

CAPACITY:

16" - 30 Yards
18" - 40 Yards
24" - 75 Yards
Gravel per Hour.

GODFREY CONVEYOR CO.

Elkhart 6, Ind.

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For further information and literature on products described in this issue, turn to page 16 for the Red Request Card. Our Reader Service Department will be glad to help you.

Contractors and Engineers Monthly

470 Fourth Ave.

NEW YORK 16, N. Y.

Widening, Surfacing Done With Plant-Mix

Old Concrete Highway Is Improved Over 13½-Mile Contract; 100-TPH Plant Midway on Job

By WILLIAM H. QUIRK,
Eastern Editor

(Photo on page 1)

HEAVILY traveled U. S. 90 east of Tallahassee, Fla., has been improved for 13½ miles. The old 18-foot concrete road has been widened 3 feet on each side with sand-asphalt plant-mix, and the full 24-foot width has been surfaced with two courses of asphaltic concrete. The job was done by the Smith Engineering & Construction Co. of Pensacola, Fla., under a \$200,000 contract with the State Road Department of Florida.

The job is located in Leon County. It begins at the eastern city limits of Tallahassee and runs east 13½ miles to the Jefferson County line. The original non-reinforced-concrete pavement contained sand and gravel for the coarse aggregate. It was constructed in 1927, with a slab section of 9-6-6-9 inches, a width of 18 feet, and with 6-foot shoulders. Expansion joints were put in at 20-foot intervals, and on the hills these slabs had a tendency to slide over one another, creating rough hard-riding joints. The pavement was also cracking badly.

Widening Operations

Widening started on October 6, 1947, and was completed by December 20. A trench 9 inches deep and 3 feet wide was dug out along the edges of the old pavement by a special drop blade mounted on the moldboard of a Caterpillar No. 12 motor grader. The excavated material was thrown off to the side and used to widen the shoulder. The trench was then filled with 9 inches of sand-asphalt plant-mix put down in two 4½-inch lifts by an Apsco spreader. The lower course was compacted by the slick treads of a small tractor, and then rolled by a Buffalo-Springfield trench roller. The top course was rolled by an 8-ton 3-wheel Buffalo-Springfield.

The plant-mix used in the widening was a combination of sand and asphalt, the latter an AC-8 with 85 to 100 penetration. The weights of a 3,000-pound batch of the mix were as follows:

Asphalt	165 lbs.
Sand	2,835 lbs.
Total	3,000 lbs.

Because of the heavy winter rains in the Deep South, the job was shut down completely when the widening was finished, and no attempts were made at surfacing. This was most unusual, as paving operations are normally carried on through the winter, even in this northern section of Florida.

The contractor used the enforced shutdown period to good advantage, however, by accumulating enough slag in stockpiles to serve the entire needs for coarse aggregate in the plant-mix surfacing. The Birmingham Slag Co. of Birmingham, Ala., supplied the slag, shipping it by rail to the Perkins siding of the Seaboard Air Line Railroad 3 miles from the plant. There it was unloaded by a Lorain 40 crane with a 35-foot boom and an Owen ¾-yard clamshell bucket. Four Mack 15-ton diesel trucks hauled it to the hot-mix plant which was set up on the south side of U. S. 90 about midway of the job.

Asphalt-Plant Set-Up

At this site a wooden barrier was constructed, behind which the slag was stockpiled and also the sand used as

fine aggregate. The ingredients of the plant-mix used in the surfacing were roughly about 75 per cent slag, 20 per cent sand, and 5 per cent asphalt. Local sand was used in the mix. It was dug from a pit adjoining the asphalt plant by a LeTourneau 8-yard scraper pulled by a Caterpillar M7 tractor, and stockpiled alongside the slag. The tractor, outfitted with a dozer blade, was later employed to doze the aggregate up against the wooden barrier. The Lorain 40 crane, moved from the railroad siding to the plant, kept the receiving hopper at the plant filled with sand and slag.

The wooden barrier at the plant was 75 feet long x 15 feet high. Pine posts, 12 inches in diameter and 20 feet long, were set in post holes 5 feet deep laid

out on 5-foot centers. Shorter posts used as knee braces supported each of the vertical posts. Between the vertical members, 2 x 10's were nailed horizontally to complete the barrier.

The AC-8 asphalt of 85 to 100 penetration which was used in the mix was purchased from the Mexican Petroleum Corp. with refineries at Destrehan, La., north of New Orleans on the Mississippi River. It was shipped by barge to St.

Marks on the Intracoastal Waterway, about 25 miles south of Tallahassee, where the Smith Engineering & Construction Co. has two permanent bitumen-storage tanks, each holding 250,000 gallons. From this storage terminal the asphalt was hauled to the plant in a Great Dane 3,500-gallon semi-trailer pulled by a Mack truck.

The asphalt had been heated to a 300- (Continued on next page)

Tribute from Operation "SNOWBOUND" to DAVENPORT-FRINK SNO-PLOWS



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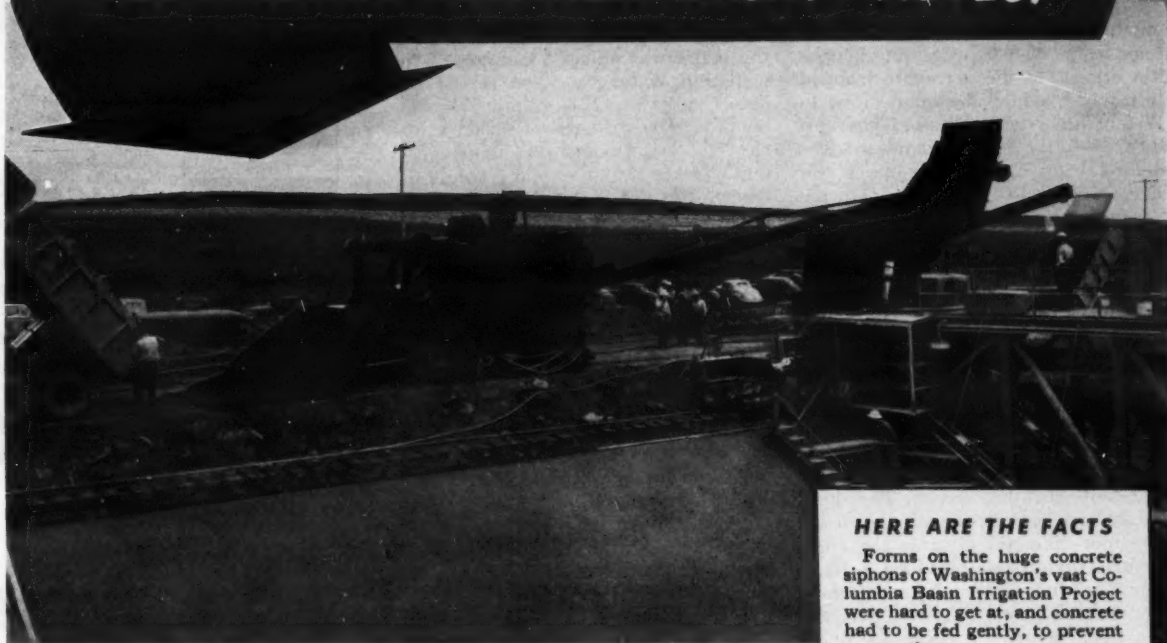
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"In behalf of the people of Cherry County, Nebraska, and of myself, I wish to sincerely thank you for the promptness and consideration given to our request for plows to help meet the snow disaster. Your plows have proved themselves to be highly effective in opening trails through some of the worst terrain imaginable. They were used on our rough, choppy sandhills far from any road, or semblance of trail, and at times in snow so deep and hard that a power unit was used to push the truck on which they were mounted. It appears that your plows are unbreakable." (Name on Request)

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HERE ARE THE FACTS

Forms on the huge concrete siphons of Washington's vast Columbia Basin Irrigation Project were hard to get at, and concrete had to be fed gently, to prevent segregation.

Utah Construction Co. and Winston Brothers Co., joint-venture firms, solved the problem with Ransome Blue Brute 34E Dual Drum Pavers. The two shown, on the West Canal, have their standard booms elevated, for discharging into a travelling hopper. The hopper travels across the open cut on a steel gantry, discharging in any position required. On the East Canal, a Ransome Dual Drum Paver discharged into big steel pipe forms, with a special 70-ft. boom that hooked to a steel tower on the form.

Thanks to Ransome's exclusive, hydraulic "live" boom with controllable discharge bucket, pouring was under positive, accurate control at all times—a vital factor in the speedy, economical completion of this huge non-paving job, totalling 164,900 cu. yds. of concrete!

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Watch a Ransome 34E Blue Brute Paver in action and you'll get an education in precision-placing. There's no fumbling, no lost motion, no "wrestling" with heavy control levers. The hydraulic "live" boom with controllable discharge bucket—found only on Ransome Pavers—operates easily and accurately . . . swings swiftly to the exact spot and discharges at just the required rate, spreading evenly to the inch inside the forms!

You can forget the split-batch nuisance, too. Load up the bucket to capacity, run it out wherever needed, and open its doors with positive hydraulic control, to discharge only the amount you want—and no more!

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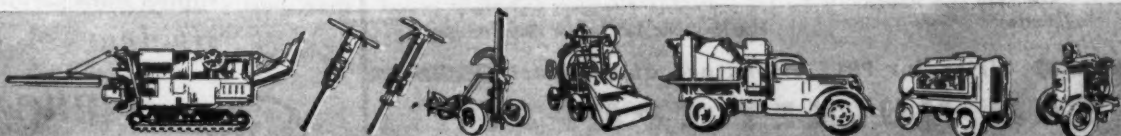
Ransome control-feature for cutting down spillage, hand shovelling and the time-wasting struggle to reach out-of-the-way forms. You can save up to \$100 a day with this feature alone. With other Blue Brute design advancements . . . Ransome's famous mixing action, accurate water measuring, all-weather batchmeter and foolproof, self-cleaning, fast-charging skip . . . it means faster, smoother progress and greatly reduced costs on every type of concreting job.

Ask your nearby Worthington-Ransome Distributor about Blue Brute Pavers, Single and Dual Drum. Or, Bulletin 208 will bring you further facts proving there's more worth in a Blue Brute.

WORTHINGTON PUMP AND MACHINERY CORPORATION

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BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

Widening, Surfacing Done With Plant-Mix

(Continued from preceding page)

degree temperature before it was loaded into the tank truck, so it was readily pumped into an 18,000-gallon horizontal storage tank at the hot-mix plant. The transfer was made by a Kinney 3-inch asphalt pump powered by a General Electric 7½-hp motor. Fuel oil for the plant operations was supplied by McDonald-Johnson Oil Co., a Pensacola dealer, and stored in a 12,000-gallon horizontal tank next to the asphalt tank. Bunker C oil was used.

Limestone dust, put in the upper wearing course for a mineral filler, was the only other material required for the mix. The dust was shipped in bags from the National Cement Co. at Birmingham, Ala., to the Seaboard Air Line siding, and then hauled to the plant in trucks. A small wooden shed, 20 x 20 feet, alongside the plant tower housed the bags of filler.

Operating the Plant

Surfacing operations began on April 5 of last year when the big 100-ton-an-hour asphalt plant started turning out the plant-mix. While mainly a Cedarapids unit, the plant included a Simplicity cold elevator, single-shell drier, and dust collector.

As the crane fed the sand and slag from the stockpiles on one side of the barrier to the 20-yard receiving hopper on the other side, the aggregate dropped onto a feeder which moved it along to a 17-foot-high cold elevator. There it was raised to the 9-foot-diameter x 17-foot-long drier. At the other end of the drier a single No. 11 Ray oil burner threw out a long tongue of flame to heat the aggregate as it passed through the large drum. In front of the receiving end of the drier was an International UD-18 diesel engine which drove the feeder, cold elevator, dust fan, and the drier. All the other units of the plant were driven by electric power.

From the drier the heated aggregate was delivered to the bottom of a 37-foot-high enclosed hot elevator which raised the material to a double-deck 3 x 12-foot vibrating screen. The dust and fines had been drawn off the drier by a 4-foot-diameter fan into the dust collector. The fan also provided a draft for the drier burner. Smoke and fumes were emitted from a 40-foot-high smoke stack, while the aggregate fines

slid down an enclosed chute from the dust collector to the bottom of the hot elevator.

When the bottom or binder course was being mixed in the plant, the top or scalping screen of the double-deck screen had 1-inch square openings. For the top or wearing course, a ¾-inch scalping screen was placed on the top deck. In both mixes the lower screen was a No. 8 sand screen. Oversize material and roots left on top of the upper screen slid down a chute on one side of the plant tower into a dump truck. About twice a day the truck got filled up and carted the spoil away for wasting.

From the screens the sand and slag dropped into bins, each holding 10 tons. From the bins the material was drawn off into a weigh bucket equipped with Kron dial-type springless scales. Where mineral filler was required in the wearing course, the lime dust was dumped from the bags into a small hopper. From there it was moved up and over to the weigh bucket in the plant tower through an enclosed elevator and dust auger mechanism.

Continuous Asphalt Loop

Steam for the plant was furnished by a Lucey 104-hp locomotive-type boiler equipped with a single oil burner. This heated the asphalt in the storage tank, kept steam in the 4-inch jacketed asphalt lines, and operated the rams on the pugmill discharge gates. Water for the boiler was pumped from an 85-foot well, but water was also stored in a metal tank, 8 x 10 x 4 feet deep and holding 2,000 gallons, set up on timber bents. Thus if anything happened to the water pump the plant would not have to be shut down for lack of water in the boiler.

The Kinney 3-inch asphalt pump which transferred the bitumen from the tank truck to the storage tank was equipped with a 3-way valve. As a result, the asphalt could also be pumped from the truck to the plant, or fed into the steam-jacketed line for circulation in a continuous loop. The asphalt at 300 degrees F was drawn off into a 40-gallon weigh bucket and then added to the aggregate for one minute of mixing in the 1½-ton pugmill.

Electric power for the plant was generated by a Murphy 180-hp diesel engine driving an Electric Machinery Mfg. Co. 100-kw generator. Seven G-E motors were powered by this diesel electric plant—a 35-hp motor on the pugmill;

three 7½-hp motors for the hot elevator, lime-dust elevator, and asphalt pump respectively; a 3-hp motor for the lime-dust auger gear; two ½-hp motors on the water pump and a bench grinder. Other plant equipment included a couple of Kohler 1½-kw electric light plants, and a 300-amp and a 200-

amp G-E electric welder.

Personnel at the plant consisted of a 9-man crew during the day, and 2 men—a fireman and a mechanic—on a night shift. The night crew saw to it that the plant was always ready to go on the following day. Smith-run asphalt plants (Continued on next page)



THROUGH CONCRETE IN JIG TIME!

DRILL BILLY says:

"HOLES DRILLED CLEANER... AND FOR LESS!"

WITH THE ORIGINAL

ROTARY CONCRETE DRILL BITS"

Wherever there's drilling to be done through concrete, brick or marble, a ROTARY Drill Bit will do it faster and better. Users in many fields of industry praise the lower cost per hole, and the way we stand back of every drill.

YOU SAVE MONEY

For use in electric or air rotary drills. Every ROTARY Bit has an exclusive, quiet, pulverizing action that leaves a sharp-precision hole. No hammering—no chiseling—no jar. FREE FACTORY RE-SHARPENING until further notice. Standard sizes ¼" to 2" diameter. Larger sizes on request. Get the money-saving facts. Write today for free, illustrated folder.

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**FLEXIBLE
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OF ONLY 3,600 R. P. M.



This amazing step-up in frequency of the vibrator head is made possible by a patented, non-eccentric rotor device found only in Vibro-Plus "Rollgear" vibrators.

50% higher frequency guaranteed—Low speed flexible shaft

- save as much as a bag of cement per cu. yd.
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- less mechanical wear and tear
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No time is lost for periodic stripping down. The flexible shaft can be lubricated in less than 20 seconds. The Vibrator Head Runs Dry. No clamping or screwing needed at the power source.

"Rollgear" is designed and built for long, uninterrupted work periods.

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1621-KE Locust

Kansas City 8, Mo.



C. & E. M. Photos
Above, Project Engineer Sam Register, Plant Inspector Leo Sullivan, and Plant Foreman L. F. Floyd on the Florida road-improvement job. At the Smith Engineering & Construction Co. plant (right) asphalt is transferred from a Great Dane semi-trailer to a storage tank by a Kinney 3-inch asphalt pump.

take a bow to no one for cleanliness and orderliness. One yard boy is assigned to keeping the place neat. That is his main chore along with occasional errands or getting tools for the men. Consequently the plant always presents an orderly appearance which likewise makes for greater efficiency in production.

The Mix

Typical batch weights totaling 3,000 pounds for the binder and surface wearing courses were as follows:

Material	Binder Course	Wearing Course
Slag	2,250 lbs.	1,860 lbs.
Sand	585 lbs.	870 lbs.
Mineral filler	120 lbs.	120 lbs.
AC-8 asphalt	165 lbs.	150 lbs.
Total	3,000 lbs.	3,000 lbs.

Typical gradation of the slag, sand, and mineral filler was as follows:

Sieve Size	Per Cent Passing			
	Binder Slag	Wearing-Course Slag	Sand	Mineral Filler
1-inch	100	100	100	100
3/4-inch	100	100	100	100
1/2-inch	98	100	100	100
3/8-inch	47	68	100	100
No. 4	12	25	100	100
No. 10	1	4	79	100
No. 30	0	0	100	100
No. 80	0	0	99	100
No. 200	0	0	90	100

Laying the Hot-Mix

Before any hot-mix was laid, the old concrete pavement and the widening strips were first swept clean by a rotary broom fastened to the front end of an Allis-Chalmers rubber-tired tractor. Then a tack coat of bitumen, 0.08 gallon to the square yard of AC-8 asphalt, was applied in a 12-foot strip at a temperature of 300 degrees F by an Etnyre 500-gallon distributor mounted on a Mack truck. This was done just in advance of the laying of the binder course.

The mix was hauled out on the job in four big Mack 15-ton diesel trucks which got loaded at the plant by running under the tower and continuing back to the road in a continuous loop without having to reverse at any time. About four times a day their bodies were mopped out at the plant with No. 2 tractor fuel oil so that the hot-mix would not harden and cling to the sides of the truck to prevent a clean dump at the finisher.

All the mix was laid by two Barber-Greene Finishers but only one worked at a time. The binder or lower course was put down to a 1 1/2-inch thickness or about 140 pounds to the square yard. The top course of 1-inch minimum thickness averaged 100 pounds to the square yard. The usual procedure was to have one finisher lay a 12-foot-wide lane on half the road on one day, and on the following day to have the second machine start at the beginning of that lane and complete the full 24-foot pavement. This was done with both binder and top courses. The finished pavement has a crown of 1/4 inch to the foot.

Work on the road started at the east end of the job and proceeded to the west end. The binder course was put down throughout before any of the wearing course was laid. The binder course was rolled by a single Buffalo-Springfield 12-ton tandem roller, while

that and a lighter Buffalo-Springfield 5 to 7-ton tandem roller were used on the top course. When rolling the top course, the heavier roller followed the finisher rather closely, while the lighter roller stayed behind and looked after the back rolling.

The finishing-machine crew consist-

ed of a foreman and four others—machine operator, raker, shoveler, and a man to guide the trucks in for dumping. The finisher carried a can of fuel oil in which the men cleaned their tools.

Traffic was maintained at all times, with a flagman stationed at each end of the working section. The only time that traffic eased on this heavily traveled

(Concluded on next page)



Above: The Lee Distributing Company's fleet of 12 trucks.

Left: Mr. Edward Lee, Jr., manager of the Lee Distributing Company, Duluth, Minn.



Stanolube HD Motor Oil

Gain these maintenance savings in your fleet operations

THE WHOLESALE FOOD business keeps the Lee Distributing Company's fleet of 12 trucks at a fast, gruelling pace. The units are continually starting and stopping at stores in and around Duluth, and, in addition, make long hauls into Minnesota, Wisconsin and upper Michigan.

Under these varying conditions of service, engines could well be expected to "sludge up" and require extra upkeep. Officials of this fleet, however, have found a way to keep maintenance at a minimum.

Manager Edward Lee, Jr., switched his trucks, in 1942, to Stanolube HD Motor Oil. In six years of hard service, there have been no bearing failures. Engines have remained clean and free of sludge. Mr. Lee reports definitely

lower maintenance costs with the use of Stanolube HD.

Evidence like this strongly indicates the economy you can gain by shifting to this truly heavy-duty motor oil. Stanolube HD has the necessary qualities to prevent trouble on the most difficult jobs. These qualities are obtained by blending effective oxidation-resistant and detergent additives with the highest quality solvent-extracted base stocks.

Make your next change of oil a change to Stanolube HD; get extra protection for engines, extra mileage between overhauls. If you are located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Oil Automotive Engineer nearest you.

STANDARD OIL COMPANY (INDIANA)





C. & E. M. Photos

Seen from fore and aft, a Mack diesel truck dumps binder-course hot-mix for the U. S. 90 improvement in Florida to a Barber-Greene Finisher on the road.

Widening, Surfacing Done With Plant-Mix

(Continued from preceding page)

route was during the first half of April when the road was closed to all through traffic because of the floods along the Suwannee River to the east. The bridge carrying U. S. 90 over the river was under water then and could not be used.

Heavy rains of the winter and spring had saturated the aggregate and thus slowed production at the asphalt plant at the start of the job. On the average, however, the plant turned out sufficient mix to lay from 4,000 to 5,000 feet of 12-foot-wide binder course during a day's run. The best production at this stage was 600 tons of material which accounted for a mile of binder 12 feet wide. The working day was 10 or 11 hours for a five or six-day week.

Quantities and Personnel

The major items included in the 13½-mile contract were as follows:

Sand-asphalt for widening	18,195 tons
Bitumen in the sand-asphalt	361,724 gals.
Tack coat, AC-8	22,422 gals.
Binder course	13,463 tons
Bitumen in binder	174,224 gals.
Surface course	9,448 tons
Bitumen in surface course	166,721 gals.

The Smith Engineering & Construction Co. of Pensacola employed an average force of 32 men on the project, counting both those at the plant and those working on the road. They were under the supervision of Albert Taylor, Superintendent, with L. F. Floyd Foreman at the plant, and Clyde Carden Foreman on the road work.

For the State Road Department of

Florida, Sam Register was Project Engineer on the contract, assisted by Inspectors C. C. Dilmore and Leo Sullivan. The project was located in the Third Division which is headed by George L. Dickenson, Division Engineer with headquarters at Chipley, Florida. F. Elgin Bayless is Chairman of the Commission and E. C. DeGarmo is State Highway Engineer with offices at Tallahassee.

One-Cylinder Diesel Is Rated at 10-15 Hp

A single-cylinder vertical-type diesel engine rated at 10 hp at 1,200 rpm and 15 hp at 1,800 rpm is announced by the Nordberg Mfg. Co., Chase and Oklahoma Aves., Milwaukee 7, Wis. Known as the Type 4FS-1, it has a 4½-inch bore and a 5¼-inch stroke. It is recommended by the company for use with small stationary and portable power applications and electric generating plants and pumping units.

Among the features claimed for the 4FS-1 are full-pressure lubrication to all crankshaft, connecting-rod, piston-pin, camshaft, and rocker-arm bearings; a by-pass filter which continuously cleans a portion of the oil in circulation; an impeller type of cooling-water pump, belt-driven from the crankshaft; a thermostat and re-circulating connection for automatic control of the cooling-water temperature; a diaphragm type of fuel-oil transfer pump; a fuel-injection pump; a flyball type of governor; and a vent line from the spray nozzle to return excess oil to the main fuel supply. Hand starting is standard,

with a 12-volt electric starter available as optional equipment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 52.

Winpower Ups Bill Tilton

W. J. (Bill) Tilton is named as Sales Manager of the Power & Appliance Division, Winpower Mfg. Co., Newton, Iowa.

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PLACES PERFECTLY UPWARDS of 65 Cu. Yds. OF STIFF MIX CONCRETE PER HOUR

Unit consists of an electric, vibratory, manually guided paving machine and Jackson Portable Power Unit.

It will undercut at the side forms; strike off to crown (both regular and inverted); roll back for second passes.

Thoroughly vibrates concrete in slab depths up to 10 inches and is quickly adaptable to any slab width from 6 ft. up to any practicable width.

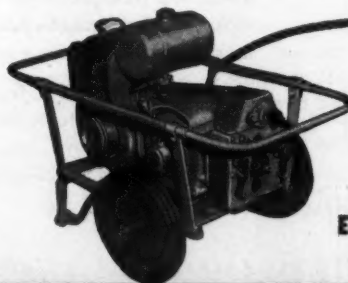
Works right up to and around sewers, manholes and other obstructions.

Machine has such strong tendency to propel itself forward that little effort is required. Operators work from front, rear or sides.

For handling municipal paving jobs, highway patching and bridge decks quickly and at a minimum of cost there is nothing like it. Write, NOW, for complete facts.

OTHER MONEY-MAKING PAVING EQUIPMENT:

Jackson Vibratory Paving Tubes for vibrating full slab-widths of highway and airport paving; Jackson Side Form Vibrators for attachment to standard finishers or spreaders to eliminate manual vibrating; vibrators for every type of construction.



Power plant usually furnished with Paving Unit: 1.25 KVA, generates both single and 3-phase 60 cycle AC. Also suitable for operating lights, vibrators, contractors tools.

Manufactured by

ELECTRIC TAMPER & EQUIPMENT CO.

for

JACKSON VIBRATORS, INC., Ludington, Mich.

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MR. CONTRACTOR, You
Can Save a Nice Piece
of Money with Your

Rotary Dryer

WRITE FOR PARTICULARS

HOPKINS' VOLCANIC SPECIALTIES
ALLIANCE, OHIO

Results Guaranteed

Convention Calendar

March 23-26—Roadside Development

Eighth Annual Short Course on Roadside Development, Auditorium of Ohio Department of State Bldg., 65 S. Front St., Columbus, Ohio. Dallas D. Dupre, Jr., Landscape Architect, Department of Highways, Columbus 15, Ohio.

March 28—April 1—N. Y. Safety Convention

Annual Safety Convention and Exposition, Statler Hotel, New York, N. Y. Paul F. Stricker, Executive Vice President, Greater New York Safety Council, 60 E. 42nd St., New York 17, N. Y.

April 6-8—N. Y. Highway Engineers

Annual Convention, New York State Association of Highway Engineers, Ten Eyck Hotel, Albany, N. Y. Arthur Moon, Convention Chairman, 1st Floor, State Office Bldg., Albany, N. Y.

April 8-9—Rivers and Harbors Congress

Thirty-ninth convention of National Rivers and Harbors Congress, Mayflower Hotel, Washington, D. C. J. G. Burke, Acting Secretary, 1720 M St., N.W., Washington 6, D. C.

April 11-14—Purdue Road School

Annual Road School, Memorial Union Bldg., Purdue University, Lafayette, Ind., and Road Show in Purdue Armory. Ben H. Petty, Professor of Highway Engineering, School of Civil Engineering and Engineering Mechanics, Purdue University.

April 11-14—Corrosion Engineers Meeting

Annual convention, National Association of Corrosion Engineers, Netherland Plaza Hotel, Cincinnati, Ohio. A. B. Campbell, Executive Secretary, 905 Southern Standard Bldg., Houston 2, Texas.

April 20-23—ASCE Meeting

Spring meeting, American Society of Civil Engineers, Biltmore Hotel, Oklahoma City, Okla. Col. William N. Carey, Executive Secretary, 33 W. 39th St., New York 18, N. Y.

Choice of Boom, Mounting With Excavating Machine

Unit-assembly construction of the Model TL-20 Lorain crane is featured in a catalog being distributed by The Thew Shovel Co., Lorain, Ohio. Form No. 5-48-60 has been prepared as a "picture trip" through the Thew factory, and is designed to show how the major components of the TL-20 are constructed as separate and complete units.

Components illustrated are the one-piece all-welded turntable bed, the engine assembly, the clutch shaft, the hoist shaft and boom hoist, and the clear-vision cab. Also described in detail in the catalog are the ten types of mountings available for the TL-20 and the five types of interchangeable booms available.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 12.

Truck Winches in 7 Sizes

Truck winches in seven sizes are described in a catalog released by Six Wheels, Inc., 1572 E. 20th St., Los Angeles 11, Calif. The Model 15-M Maxi winch is for installation on 1½ and 2-ton trucks; the 20-M for 2 and 3-ton trucks; the 25-M for 3½ to 5-ton

trucks; the 30-M for 5 to 7½-ton trucks; and the 40-M for heavy-duty material-handling operations in combination with tractor and semi-trailer loads. Also described in Catalog W-1 are the Models MF-20 and MF-40 Hi-Speed winches.

The catalog lists several specifications

for the Maxi winches, including single-line capacities, standard and optional ratios, main-shaft size, drum-cable capacities with wire rope of various diameters, and weights. Also listed are optional arrangements available for the standard winches. These include an extended shaft with two hanger brackets,

an additional gypsy head, various arrangements of single and double hanger brackets and gypsy heads, ratchet and pawl, extra brake, and special transmissions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 47.

Base Your Estimates on a SEAMAN Pulvi-Mixer

Get the real "low-down" on mixing costs — check the records Seaman Mixers have been making all over the country on all types of jobs.

Here is a mixer that is versatile . . . can handle a wider variety of mixing and pulverizing jobs . . . costs less to own and operate than any other type . . . that does as much work per hour as the largest machines and produces a mixture of the highest quality by actual test. Before you start your next job — get the facts from Seaman.



Bituminous

The Seaman Pulvi-Mixer handles all types of bituminous mixing with equal efficiency either in-place or from windrows, on new construction or resurfacing jobs.

Processing with a Seaman assures a mix of uniform density; LATERALLY . . . because of the pitch of the tines; LONGITUDINALLY . . . because of the forward carry-over in the hood; VERTICALLY . . . because of the adjustable depth control. You blend out "rich" and "lean" spots — compensate for variable aggregates — aerate excessive moisture in materials — and leave a shaped, level, graded surface ready for rolling.

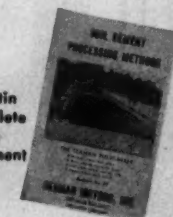
Send For Bulletin No. 25. A new, authoritative, 85-page booklet on all types of Soil Stabilization Methods.



Soil-Cement

In soil-cement processing, the quality of mix is extremely important — the soil must be finely pulverized, the cement and water thoroughly dispersed and mixed into the soil to form a homogenous mixture that can be readily compacted. The Seaman mixer on each trip pulverizes, mixes and remixes the materials to obtain the uniform blending possible only with multiple passes. The high velocity rotor disperses the materials vertically, laterally and longitudinally from the sub-grade to the surface over the entire processing area.

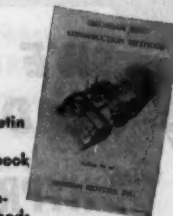
Send For Bulletin No. 50. A complete treatise on the latest Soil-Cement processing methods.



Macadam

The stronger the base, the better the road. That is why more and more Macadam base roads are being built with Pulvi-Mixers which assure uniform depth and blend of the aggregate and prevent segregation and stratification of the materials. The Seaman disperses the fines from top to bottom, filling the voids and assuring a more positive keying and locking of the aggregate. It also saves hundreds of manhours per mile by eliminating the slow, costly hand "brushing-in" of the fines. The Seaman leaves a thoroughly blended, homogenous texture ready for immediate compaction.

Send For Bulletin No. 60. An authoritative book let on modern Macadam construction methods.



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282 NORTH 25th, MILWAUKEE, WISCONSIN

BE SURE YOUR NEXT TRAILER HAS ALL THESE FEATURES

- Deep, wide flange main beams running the full length of the trailer, I-Beam sections for cross-members and outriggers, improved, fabricated gooseneck, and all electric-welded construction. Look at all the other features found only on Jahn tandem axles: (1) constant lift cam, (2) two full-width axles attached to longitudinal rocker beams, (3) worm gear type slack adjusters at each wheel, (4) heavy coil springs at each axle and (5) positive equalizing braking at each wheel regardless of position of axle.

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Heavy duty trailers from 5 to 100 tons.



ATLAS CONCRETE FORMS

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Irvington
FORM & TANK CORP.
Irvington, N. Y.



The Transitier fork-lift truck can be used for loading and unloading, and transporting materials and equipment on job locations and in repair shops. Lift capacities of the two models are 1,000 and 2,000 pounds.

Fork-Lift Truck Has Capacity of 1 Ton

A new fork-lift truck has been announced by the Transitier Truck Co., 2477 N. W. 23rd Ave., Portland 10, Ore. It can be used for transporting and stacking materials, tools, equipment, and equipment parts on a job and in repair shops. It features an all-welded one-piece body frame construction; a 26-hp Cobra gasoline engine; a 61-inch turning radius; and a hydraulically operated lift-and-tilt mast. The Hydroflex clutch is located behind and above the engine for easy accessibility. An automotive-type grouping has been used for all the controls.

The Transitier truck is made in two models with capacities of 1,000 and 2,000 pounds. Both models are available with

5, 7, or 9-foot lift heights. Weight of the 2,000-pound Transitier is approximately 3,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 96.

Drawer-Type Cabinet For Filing Drawings

A drawer-type steel cabinet for filing blueprints and engineering drawings is available from Cole Steel Equipment Co., Inc., 285 Madison Ave., New York 17, N. Y. The Cole blueprint cabinet is available in two sizes: in one, inside drawer dimensions are 37 x 25 x 2 1/4 inches; in the other, inside drawer dimensions are 43 x 32 x 2 1/4 inches.

The cabinets feature smooth-gliding drawers which ride on ball-bearing rollers. A lift compressor in the front of the drawer and a hood in the rear are designed to prevent the filed material from curling, creasing, or tearing. The cabinets are made in 5-drawer units which can be interlocked to provide as high a unit as required. A 7 1/2-inch-high base is available for the bottom section. Colors are olive green or a grey crinkle finish. These cabinets are also available equipped with an automatic plunger-type lock which controls all five drawers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 83.

Building-Repair Handbook

A handbook on a line of materials for building maintenance, and how to use them, has been prepared by the Flexrock Co., 3624 Cuthbert St., Philadelphia 4, Pa. The Flexrock line includes materials for stopping leaks and

seepage; for patching, sealing, and finishing concrete floors; and for roofing and roof repairing.

The booklet describes each material and the types of work for which it is recommended. Directions tell how to prepare the surfaces to which the material is to be applied, how to prepare the material for use, and how to apply it. Photographs show the major steps in each process. The catalog contains data on general costs and on the life expectancy of the repaired surfaces, as well as packaging information on the various products.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 120.

Wesco Moves in Pittsburgh

New Pittsburgh headquarters have been opened by the Westinghouse Electric Supply Co. The company's entire activities are now consolidated in a new office building and warehouse at 209 W. General Robinson St., Northside.

Quality Couplings ...For Reliable LOW COST Service



"G J-BOSS"

GROUND JOINT, STYLE X-34 FEMALE HOSE COUPLING

For all high or low pressure steam, air and fluids, including oil, hydraulics, butane, etc. Washerless construction provides a leak-proof, soft-to-hard metal seal between stem and spud. Malleable iron "Boss" Offset and Interlocking Clamp exerts powerful, full-circumference grip on the hose—proof against blow-offs. Cadmium plated—rust-proof. Sizes 1/4" to 6".

Note: For washer type couplings of otherwise identical design, specify "Boss" Female Couplings, Style W-16.



"BOSS" MALE COUPLING STYLE MX-16

Companion coupling to both the "G J-Boss" and "Boss" Female Couplings. Corrugated stem has strong hex section for wrench, and collar to engage extensions on clamp segments. Clamp is efficient "Boss" Offset and Interlocking construction. Sizes 1/4" to 6", with each size fitting same size straight end hose.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods.

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"WE CLEAN A ROAD
GRADER IN 8 HOURS

with **HYPRESSURE JENNY**

HAND CLEANING
USED TO TAKE
80 HOURS"

HYPRESSURE JENNY CLEANS

by a highly atomized mixture of steam, hot water and cleaning compound applied under pressure through an adjustable spray gun. Mud, muck and grease are removed almost instantly. Hypressure Jenny is portable... easy and economical to use. Ordinary labor can operate it. Full-powered, all-purpose, heavy-duty models are available from \$445 to \$395.

Hypressure Jenny cleans all types of construction equipment... 10 times faster than it can be done by hand.

Here's what some other construction equipment users say about Hypressure Jenny steam cleaning:

"We save \$25.00 on each piece of equipment we clean with Hypressure Jenny."

"Hypressure Jenny steam cleaning helps us locate fractures and trouble on bulldozers before they break down."

"One man with Hypressure Jenny can clean equipment in one hour that formerly required 18 hours to clean by hand."

If you would like to know how Hypressure Jenny can save you time and money, just mail the coupon. There is no obligation.

HYPRESSURE JENNY DIVISION

HOMESTEAD VALVE MFG. COMPANY

"Serving Since 1892"

Coraopolis, Pa.

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Homestead Valve Manufacturing Co.
P.O. Box 30C, Coraopolis, Pa.

We employ mechanics on equipment repair work.

We recondition pieces of ☐ equipment,

☐ trucks each month.

We clean pieces of equipment, ☐ trucks each month.

We are interested in cleaning ☐ floors, ☐ walls,

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Based on above facts, please show us the savings or extra profit Hypressure Jenny can produce.

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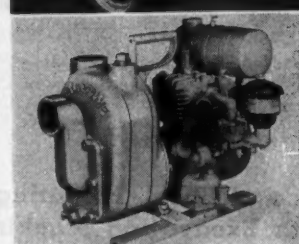
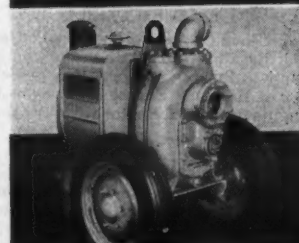
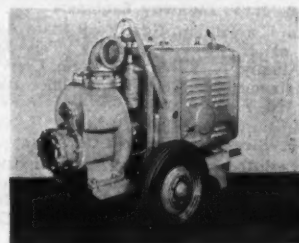
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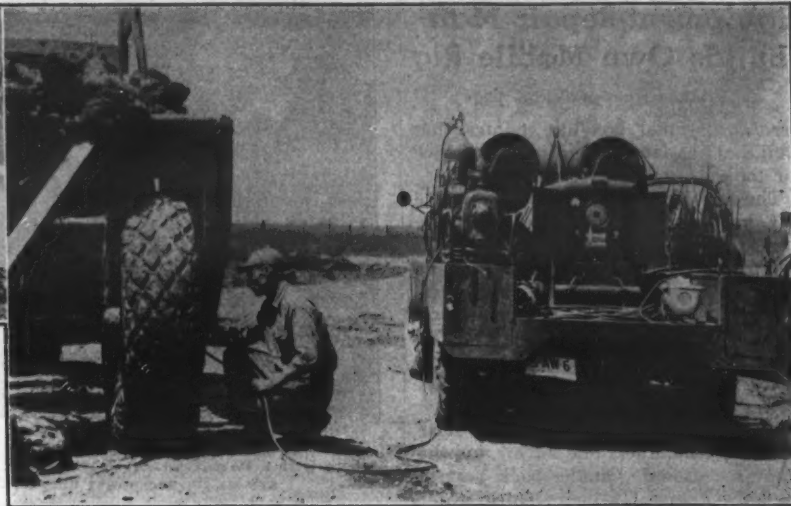
Classified Advertising Dept.

Contractors & Engineers Monthly

470 Fourth Ave.
New York 16, N. Y.



Hobart Brothers Co. Photos
The nucleus of Maintenance Boss Dangler's Repairmobile—a combination arc welder and power unit—enables the workman above to make an arc-welded repair to the slide of an International TD-18 tractor. It also powers an MGC 7-cubic-foot air compressor which furnishes air to the tires of the Bucyrus-Erie scraper shown at right.



Toolboxes, Reels, Etc.
The next step was to provide for toolboxes to hold the portable electric tools and hand tools required for equipment

repair and servicing. Accordingly, the back fenders of the Power Wagon were removed and the rear wheels were covered. (Concluded on next page)

Equipment-Repair Man Builds Own Mobile Rig

Designs "Repairmobile" to Service Contractor's Earth-Moving Units Spread Out on Five Different Jobs

MAINTENANCE Boss Sterling Dangler of the Westbrook Land & Improvement Co. was dissatisfied. Maintenance and repair work on the company's earth-moving and contracting equipment was too slow. The Construction Superintendent was dissatisfied, too, and he asked Dangler to do something about it.

Now the company had five jobs going at once, all of them in different locations. So some of its equipment was busy on a new winter-sports building, some on a 20-acre development plat for new homes, and the rest scattered about on still other jobs. It was no easy matter to get around to all these units for regular service and repair. But Dangler had read in various construction magazines about the advantages of portable service rigs that can be taken right to the equipment while it is on the job. These, he decided, were the solution to his problem. And he at once made plans for a portable repair and service rig of his own design.

The Repairmobile

Having seen how other service rigs are constructed, Boss Dangler started making notes of their good and bad

points. He noted especially that some of them lacked equipment that could be used to advantage in servicing and repairing earth-movers. So when he and his boys started on their Repairmobile, as they called it, using a Dodge Power Wagon to hold the rig, Dangler knew from his notes exactly what he wanted on his truck. He requisitioned the equipment accordingly.

As each piece was received, it was placed in a tentative position on the floor of the service shop. And when all of the equipment was finally received and positioned on the floor, work was started on the truck.

Shop Nucleus

It was important to have electric power on the truck for operating electric hand tools and for lighting night work. Rather than have the equipment operate from a power take-off, Boss Dangler at first decided that he would make a power plant the nucleus of the mobile repair and service truck. But then he had what he considered a still better idea: to use a combination gasoline-engine-driven ac arc welder and ac power unit as a nucleus.

This compact machine would offer both welding and power service from the same gasoline engine, and would save considerable space for other equipment, he figured. So he had a 300-amp arc welder and 8-kw power unit placed exactly in the center of the space marked off on the floor of the service shop. Along the right side of this unit an acetylene tank was placed horizontally, and along the left side an oxygen tank was placed horizontally.

"Safer Stops... 33% Longer Brake Life!"

...says Henry Melig, veteran 4-state hauler



Henry Melig, Milwaukee, Wis. — who has handled all kinds of hauling jobs in Wisconsin, Indiana, Illinois and Iowa for over 29 years, says: "Our two La Crosse trailers have the best brakes of any trailers we use. They're bigger, more rugged . . . give faster, more dependable stops. Best of all, we only need to reline them every 3 years, compared with every 2 years for brakes on our 5 other trailers. Our oldest La Crosse is 9 years old . . . and is still going strong after 200,000 tough miles."

You, too, will get extra miles of low-cost service with La Crosse.

LC-3

Single, Dual, Tandem Axle models to 100 tons cap. . . also 6 to 10-ton tilting trailers.



LA CROSSE TRAILER CORPORATION, La Crosse, Wis.

☐ Rush complete details on LaCrosse Trailers ☐ I may be interested in a . . . ton trailer about . . . (date)

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WHEELBARROWS
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LAWN ROLLERS

Equipment-Repair Man Builds Own Mobile Rig

(Continued from preceding page)

ered with steel box-like affairs that would act as fenders and provide space for tools as well.

The full-length running boards were left intact to provide space for the grease drums, two on each side of the truck. The box-like affairs to be used as fenders and toolboxes were welded to the back edge of the running boards and to the bed of the truck. The space left for toolboxes measured 15½ inches wide, 17½ inches high, and 23½ inches deep.

On top of the left fender two hose reels were mounted, one for air and the other for grease. On the back part of the left fender a 1½-inch electric water pump was mounted. On top of the right fender two hose reels were mounted, both to be used for grease. Over the electric-motor-driven air compressor, which is located directly in front of the welder and power unit, a rack was built to hold two cable reels. One reel holds the electrode and ground cables for arc welding, while the other reel holds the electric power cable for operating tools, equipment, and electric lights.

Derrick

Another much needed piece of equipment was a derrick to lift motor blocks and to do other lifting jobs on the various projects. The derrick on Dangler's rig consists of an A-frame made from 14-foot lengths of 3-inch pipe. To the closed end of the A-frame a pulley is fastened, while the pipe at the open end is fastened to the bumper plate with pins. The power winch of the Power Wagon is used to elevate the derrick to the proper height, and then guy wires are fastened to the rear of the truck to hold the derrick in lifting position. Any lifting job within the capacity of the A-frame is performed by the power winch and derrick. When the derrick is not in use, it is disassembled and carried underneath the running board of the truck.

Other Equipment

The Repairmobile's list of equipment reads like the inventory of a well equipped stationary repair and service shop. It includes:

- 1 Hobart combination 300-amp ac arc welder and 8-kw power unit
- 1 Motor Generator Corp. 7-cubic-foot electric air compressor
- 1 Jaeger 1½-inch electric water pump
- 1 Thor ¾-inch electric drill
- 1 Thor portable electric grinder
- 1 Reed-Prentice electric chain saw
- 1 Oxyacetylene welding and cutting outfit
- 4 Alemite high-pressure barrel pumps
- 3 Alemite hose reels
- Air-hose reel, welding-electrode and ground-cable reel, power-cable reel
- Jacks, wrenches, etc.

Self-Contained Unit For Filtering Water

A lightweight portable water filter is made by the Sparkler Mfg. Co., 1203 W. Lake St., Mundelein, Ill. This horizontal gravity water filter is especially recommended by the company for use on out-of-the-way construction jobs where a supply of fresh, clean drinking water is not always available.

According to the manufacturer, the Sparkler filters will remove all sediment and off-color from water, as well as chlorine or other undesirable tastes. It also removes as much as 98.4 per cent of the coliform organisms usually found in water, according to recent tests.

Filtration is accomplished when the water passes through two stainless-steel screens and a carbon pad. The pad contains an element designed to



Hobart Brothers Co. Photo

Timber doesn't stand in the way long for Boss Dangler and his crew. They just cut it down with a Reed-Prentice electric-motor-driven chain saw powered by a combination arc welder and power unit on their mobile repair and service rig.

keep bacteria from accumulating in the pad itself. The filter is gravity operated and is in operation as soon as water is poured onto it. It does not require any

pipes or other mechanical devices.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 118.

Spherical Roller Bearings

Spherical roller bearings are the subject of a 44-page catalog prepared by SKF Industries, Inc., P. O. Box 6731, Philadelphia 32, Pa. Catalog No. 285 emphasizes the construction of these bearings and how it fits them for special applications. It also lists features claimed for them—that they are inherently self-aligning, will withstand high shock loads, will take two-way thrusts, need no adjustment, etc.

A section of the catalog describes various applications for these bearings in construction equipment and machinery, and in other industries. Another section tells how to select the proper spherical roller and spherical roller thrust bearings for any particular application. These data take into consideration the equivalent bearing loads and the relation between load and life.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 112.



TILT-LEV BLADE—with auxiliary blade—both hydraulic controlled. Unexcelled for building shoulders and general road and street maintenance.



FORCE FEED SPREADER—Noted for its dual feed control, its accuracy and close adjustment. Comes in four sizes.

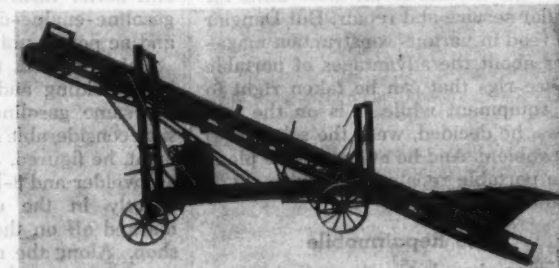
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SEND FOR DETAILS
DEALERS EVERYWHERE

THE BURCH CORPORATION
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CAR UNLOADER—For handling coal, slag, stone, etc. Adjustable height, 26' or 32' boom, 12 H.P. gas engine.

Operators Prefer Yaun



THE PERFECT BALANCE OF A YAUN CUTS DOWN ON OPERATOR FATIGUE. ASK ANY OPERATOR WHO HAS USED A YAUN. HE'LL TELL YOU THEIR PERFECT BALANCE AND ALL-WELDED CONSTRUCTION WILL OUTWORK OTHER BUCKETS. ASK YOUR DEALER FOR THE LATEST YAUN LITERATURE, OR WRITE DIRECT.

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Airport Is Enlarged Inside of Dock Wall

(Continued from page 1)

eastern end which fronts on Lake Michigan, for the runway runs nearly due north and south. A steel dock wall of structural members and sheeting was erected down the east side of the island, tying back at the south end to form a capital L in reverse. The area within this wall and the rest of the island has been filled with sand dredged from Lake Michigan. On this made land, a north-south runway was constructed 2,800 feet long x 150 feet wide. West of the runway, 175 feet, is a paralleling taxiway also 2,800 feet in length x 50 feet in width. It has connections to the runway at both ends and at three intermediate points.

The portion of the island in existence before this improvement was man-made. The slender strip was reclaimed from the lake by constructing a dock wall to outline the site and filling in the enclosed area. The old docks or piers consisted of two parallel rows of timber piling which had cross rods for connectors and were filled with heavy stone riprap. During Chicago's Century of Progress Exposition—the World's Fair—this portion of the island which lies across the lagoon from Soldier Field Stadium and Burnham Park served as a site for some of the exhibits.

Several Contracts

Work on the improvement of the Northerly Island Airport, which cost approximately \$1,758,000, started the latter part of July, 1947. The City of Chicago awarded a contract for constructing the steel bulkhead and placing the hydraulic fill to the Great Lakes

Dredge & Dock Co. of Chicago on its low bid of \$948,536. This part of the project was completed in September, 1948.

Following that contract, the Rock Road Construction Co. paved the runway and the connections to the taxiway. The bulk of the taxiway had been constructed previously on the original portion of the island. All pavements are bituminous. A small administration building has been erected at the north end of the taxiway by Morris Perlman Associates. Both the paving and building contractors are also from Chicago.

During the Road Show of the American Road Builders' Association at Soldier Field last July, twelve manufacturers of construction equipment and materials built an 18,000-square-yard plane-parking area at the airport, for the purpose of demonstrating their machines and the soil-cement type of surface. The original 4-inch surface of crushed rock was removed from the proposed plane-parking area, and the soil beneath was stabilized to a depth of 6 inches with 10 per cent of portland cement. The crushed rock was then worked back over the area. The parking area is located off the northeast corner of the runway on the original part of the island.

Steel Bulkhead

The new steel bulkhead wall starts at the south end of this plane-parking area and runs southward from the old timber bulkhead for 2,446 feet. At this southeast corner of the airport, the new bulkhead makes a right-angle turn and continues west for 346 feet to tie in to the existing south shore of the island. The rectangular area enclosed was filled in with hydraulically placed lake sand.

(Continued on next page)

Mall Vibrators

Never Waste a Minute...



\$158.00
f. o. b. Chicago

On all types of concrete construction, Mall Portable Vibrators set the pace for mixing and pouring. Their continuous, dependable operation enables contractors to estimate, schedule and complete jobs on time at a profit. For their size, Mall Vibrators place more concrete faster than any other vibrator.


A size and Model for Every Job. Mall 1½ H.P. One-Man Short Coupled Electric Unit, illustrated above, for placing concrete in small forms, thin wall sections and hard-to-reach areas; also 1½ H.P. Universal Electric; 2 and 4 H.P. Gasoline Engine; and 7500 f.p.m. Pneumatic models. Gasoline Engine units operate other tools.

Your Mall Dealer will gladly help you select the Mall Vibrator best suited to your needs. Write for FREE Booklet "Mall Vibrators."

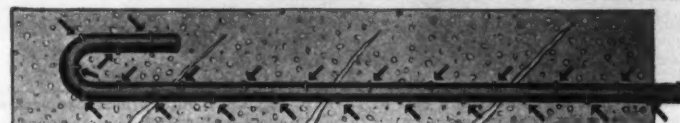
New Mall One-Man Short-Coupled
1½ H. P. Electric Vibrator

MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.

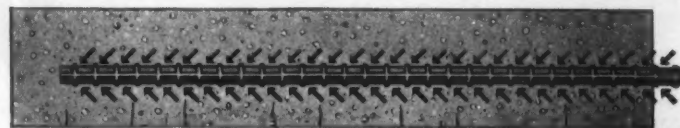
The fifth of a series in the interest of more efficient use of steel... a vital American resource.



ON BOXES or REINFORCING BARS!



Old style reinforcing, with localized anchorage—conducive to widely spaced open cracks.



Laclede Multi-Rib Bars adequately transmit stresses to concrete by uniformly distributed anchorage. Small, closely spaced cracks do not open under load.

The hook, which has been the symbol of bond strength in 30 year old codes has been succeeded by the balanced design of reinforcing bar deformations specified in ASTM Specification A 305-47 T. The balanced design and distributed strength of Laclede Multi-Rib Reinforcing Bars meet these new requirements—assure a more efficient use of steel and a better job!



Modernize your specifications—with ASTM
A 305-47 T and Laclede Multi-Rib Bars!

LACLEDE STEEL COMPANY

St. Louis, Mo.

U. S. SECURITY BONDS are a good investment

BUY THEM REGULARLY

LITTLEFORD

model no. **101**

UTILITY SPRAY TANKS



*takes the place
of three units*

FOR A UTILITY UNIT to do Road Maintenance work the Littleford No. 101 was designed to do just that. Here's an outfit that can do the work of three units—it has a spray bar for doing small application jobs, a hand spray attachment for doing patch work and a pouring pot outlet for doing patch work or crack filling. This 101 Unit has a fast heating system including U type heat flues with Littleford Vaporizing Torch Burners. The No. 101 will handle Asphalt, Tar, Emulsion, Road Oils or Cutback. Made in sizes to fit any road maintenance job. For further details see your nearest Littleford distributor.

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"Kwik-Melter" Roofers Kettles
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LITTLEFORD

LITTLEFORD BROS., Inc.

485 East Pearl St., Cincinnati 2, Ohio

Asphalt Supply Tanks
No. 101 Utility Spray Tanks
84-RD Asphalt Kettles

Airport Is Enlarged Inside of Dock Wall

(Continued from preceding page)

The Great Lakes Dredge & Dock Co. contract also included removing the old pier down the water line on the east side of the island, and moving its heavy stone filling to the outside of the new wall to serve as protective riprap.

All the steel for the wall was furnished to the contractor by the Chicago Airport Commission. It was supplied by the Carnegie-Illinois Steel Corp. of Chicago, and delivered to the Great Lakes Dredge & Dock Co. yard at Goose Island on the north branch of the Chicago River. From there it was towed on barges to the job site.

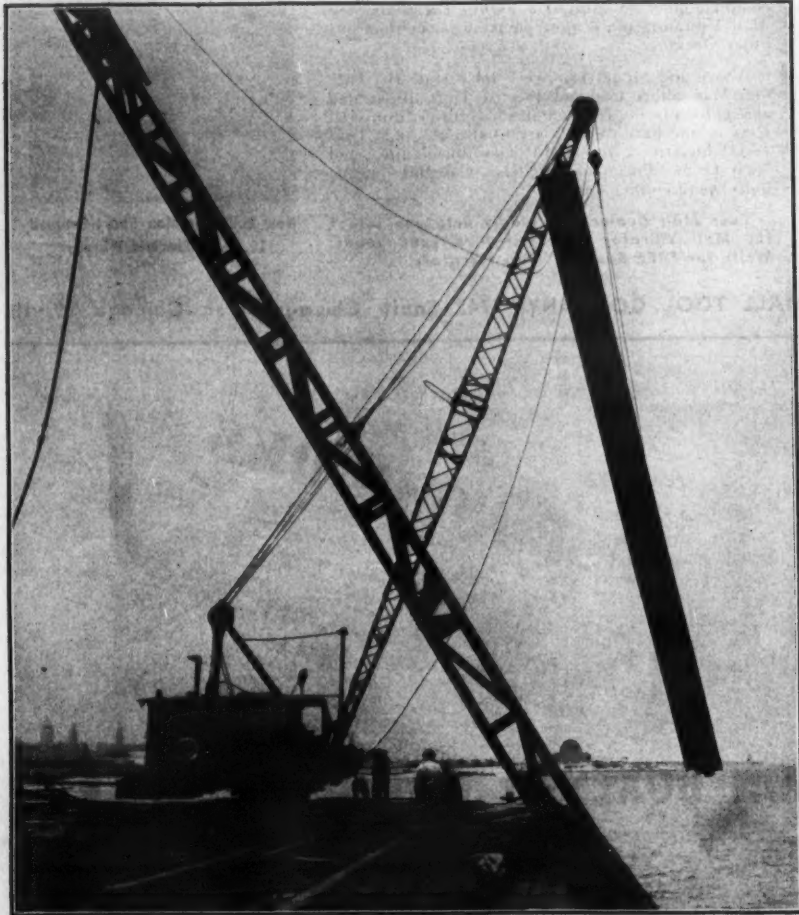
The long eastern bulkhead wall consists of a row of vertical steel beams driven on 10-foot centers and topped by a V-shaped steel plate with 1-foot sides. The point of the bent plate is at the top, with the sides sloping downward at the rate of 3 vertical to 2 horizontal. The sides of the plate thus served as a guide for driving both the batter beams at the rear or landside of the wall, and the steel sheeting at the front or lakeside.

One Wall, Different Sections

Because of the varying depths of water in the lake and the different types of material in the lake bottom, the wall was divided into several sections which were designed to cope with the existing

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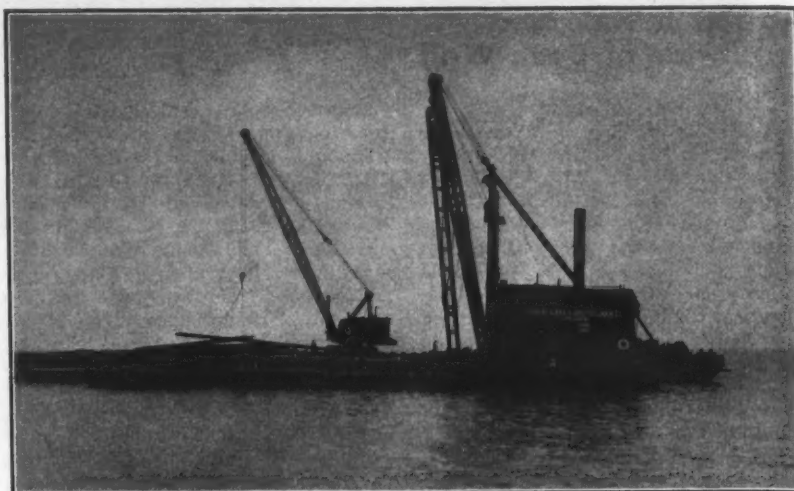
C. & E. M. Photos



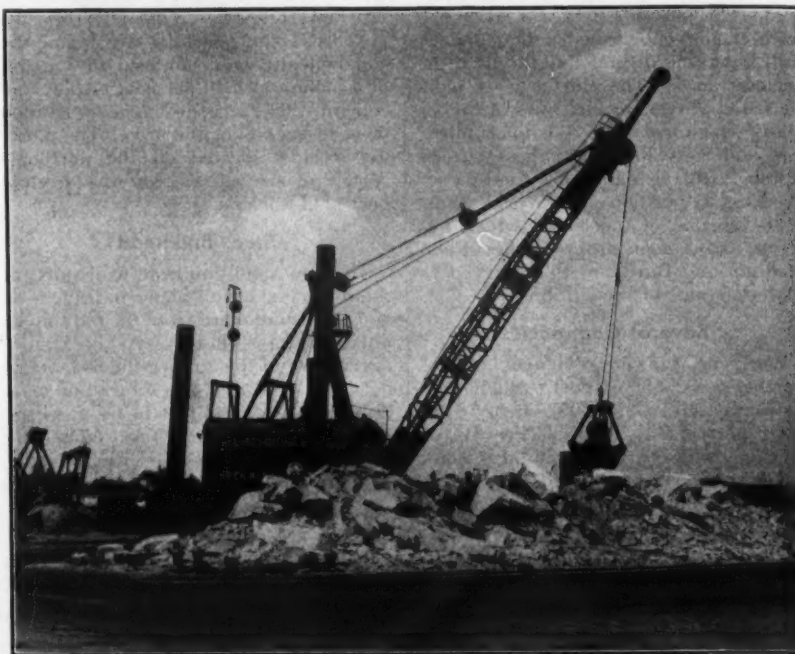
A Bucyrus-Erie crane swings a pair of sheet piles from a supply barge to special leaders on the driving rig. The piles are going in to the dock wall which now encloses made land to enlarge Chicago's Northerly Island Airport.



A McKiernan-Terry 1082 hammer drives the 61-foot battered piles for Section 3 of the wall. The piles are ME-32 at 21 inches, fastened together with spot welds.



Both crane and pile driver were mounted on floating rigs, as you can see—a 120-foot barge, the No. 11, mounted the crane, and the floating derrick No. B5 did the driving.



Another floating derrick, the No. 58, a Bucyrus-Erie steam rig, digs stone from an old dock wall on the island, and loads it into a scow for use as riprap along the new wall.



Sand to fill in the area enclosed by the wall was dredged from the south end of Lake Michigan and hauled 17 or 18 miles to the job site in the hopper dredge Michigan.



At the dock, the Michigan's 120-inch section of discharge pipe is connected to the land line so that she can begin pumping her load of hydraulic fill to the area behind the wall.

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physical conditions. Thus Section 1, the northerly 1,301 feet of wall, has 10-inch CBP 42-pound vertical steel beams, 48 feet long, on 10-foot centers. After these were driven and capped, they were supported at the rear or landside by driving 10-inch CBP 42-pound batter beams, 58 feet long, on 8-foot centers. The batter corresponded with the slope of the bent plate cap. The batter beams were fastened to the cap with bolts, and over each beam went a stiffener plate.

At the front or lakeside of the wall, 743 steel sheet piles, 61 feet long, were then driven on that same 3 to 2 batter. The sections employed were MZ-32 at 21 inches. These were fastened together in pairs with spot welds, 2 to 3 inches long, on approximately 10-foot centers running the length of the sheeting.

Section 2, 450 feet long, is immediately south of Section 1. Here the lake bottom is composed of softer material and the depth of water is also somewhat greater; so longer steel members were required for the bulkhead. The vertical beams are 12-inch CBP 53-pound, 50 feet long, on 10-foot centers; while the batter beams are 14-inch CBP 73-pound, 70 feet long, on 8-foot centers. For sheet piling, 300 MZ-38 at 18 inches, 70 feet long, were used.

Section 3, the lower 675-foot portion of the eastern wall, is like Section 1 with respect to the vertical and batter beams, as well as the sheeting, which required 385 pieces. The sheeting and batter beams in Sections 1 and 3 were driven to elevation minus 45.0, while in Section 2 they were driven to elevation minus 56.0. The elevation of Lake Michigan is considered to be 0.0. This city of Chicago datum is approximately 580 feet higher than sea level of the Atlantic coast at New York City.

At the southeast corner of the new wall, a different type of bulkhead was constructed. It projects out beyond the long easterly line to support a lighthouse which will be erected at that point. The easterly projection is 21 feet 9 inches, then the wall turns south again for 20 feet 10 inches. It turns back towards the west for another 21 feet 9 inches to form a rough square for the lighthouse station. Section 4 continues the wall westward to the existing portion of the island, a distance of 301 feet.

The 65 linear feet of lighthouse section and Section 4 are both constructed with vertical sheeting, MZ-32 members, 48 feet long. Section 4 is anchored with 10-inch CBP 42-pound battered beams 52 feet long, driven on 4-foot centers. Inside the lighthouse section 10-inch CBP 42-pound beams were driven in three rows on 4-foot 6-inch centers, as a foundation for the lighthouse. Concrete was placed within the sheeting members around the lighthouse wall in order to make a tight fit and thus retain the sand fill.

Pile Driving

All the pile driving on this project was done from floating rigs. The vertical steel beam piles were driven by the No. 69 rig, a floating pile driver with permanently fixed leads 60 feet long. It was held in place by four cables, two at the bow and two at the stern, with the bow and stern cables at one side fastened to the same anchor, and the other two lines secured to piles already driven. The driving was done by McKiernan-Terry hammers, either a 9B2 or a 9B3.

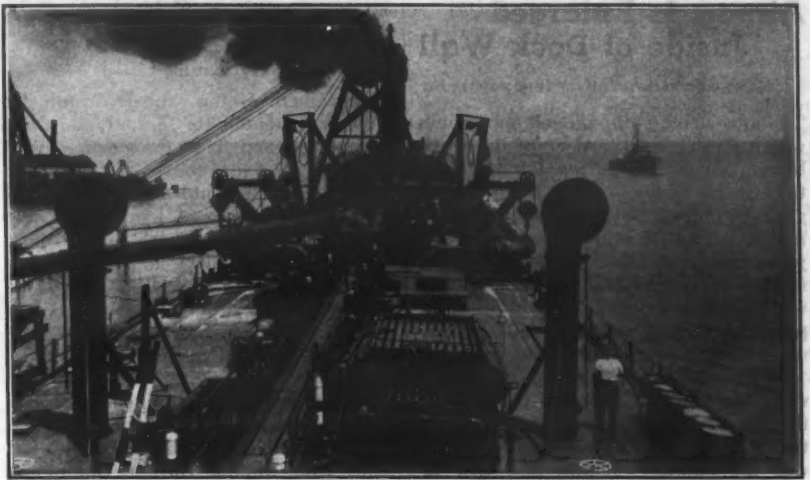
After these vertical beams were driven, the carpenter derrick boat No. 161 was moored alongside to cut the steel off to grade with torches. The No. 161 is of steel construction and measures 75 x 25 x 6 feet deep. It was equipped with a Lincoln 400-amp electric welder for welding the V-cap along the top of the vertical beams. It also has a derrick with a 25-foot boom powered by a Sasgen one-drum hoist.

The batter beams and then the battered sheet piling were driven next, deep into the clay bottom of Lake Michigan. The piles were handled by the No. 11, a 120-foot barge on which was mounted a Bucyrus-Erie crawler-type crane with a 70-foot boom. The crane lifted the steel off the supply barges and placed it in the leads of floating derrick No. B5 which did the driving.

No. B5 Driver

Derrick No. B5, the driving rig, consists of a steel barge 120 feet long x 40 feet wide x 8 feet deep, equipped with an 85-foot boom tied back to a 60-foot-high A-frame. It has a capacity of 65 tons. Its coal-burning horizontal boiler powers an American three-drum main hoist, one drum hooked up with the boom and the other two on the two main load lines. It also has a two-drum deck hoist for the swing engine, and a spud on each side to anchor the rig while at work.

From the tip of the boom the 86-foot

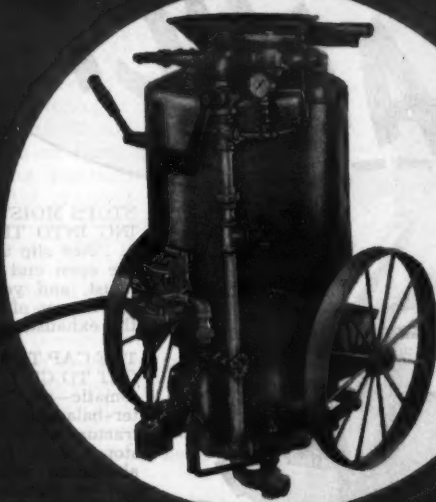


C. & E. M. Photo

You are looking aft down the deck of the dredge Michigan as her hoppers of sand are pumped out to the area enclosed by the steel-sheeting wall.

steel leads were hung, with their lower end resting on a work barge. The leaders were designed by the Great Lakes

Dredge & Dock Co.'s Mechanical Department, and built in the yard shop. (Continued on next page)



GREATER IMPACT!

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Airport Is Enlarged Inside of Dock Wall

(Continued from preceding page)

The lower end is pin-hinged on timbers which run across the deck of the work barge. According to the 1-foot variation in the water level of Lake Michigan, the bottom of the leads was moved in and out on the skid timbers; final adjustments were made with the boom from on top. The leads were 20 inches wide to accommodate a pair of sheet piles. A McKiernan-Terry 10B2 hammer drove the battered piles.

The work barge or the No. 11 rig was stationed along the line of piling with the lower end of the leads resting over the V-shape cap. The B5 pile driver was immediately behind and tied to the barge in front by lines. The supply barge with the steel was moored at the side of the No. 11. The big barges were easily moved back and forth along the piling by means of their lines and deck hoists.

After the battered steel was cut off to grade with the torches on the carpenter derrick boat, each sheeting was bolted to the V-cap and to the stiffener plates wherever they occur. The bolting operation was done from rig No. 161 with Thor and Ingersoll-Rand impact air wrenches powered by an Ingersoll-Rand 315-cfm air compressor.

As many as 66 individual sheet piles were driven in a 12-hour period. Ordinarily the work day lasted 8 hours, but bad weather on the lake often suspended the pile driving, and lost time was made up by working into the night whenever feasible.

Placing Riprap

Derrick No. 58 was used for handling the riprap—for digging out the stone from the old dock wall, loading it into a scow, and placing it in front of the new bulkhead. The barge for No. 58 measured 120 feet long x 42 feet 5 inches wide x 10 feet deep, and was equipped with a Bucyrus-Erie oil-burning steam rig. Its 70-foot boom has a 30-ton capacity. A spud on each side held the rig in place while it was working. Most of the digging was done with 3½-yard orange peel buckets, though a couple of 2½-yard clamshell buckets were also carried along on the deck in case they should be needed.

The stone for the riprap was loaded onto a 1,100-ton scow and towed to the piling line where it was placed on the lakeside in front of the steel sheet piling. It was piled up on the lake bottom on a 2 to 1 slope to a point 10 feet below the water level on Sections 1 and 3, and to 19 feet below the water level on the deeper Section 2. The finished grade at the top of the piling is at elevation plus-6.0, or 6 feet above the water level of the lake.

Floating equipment was towed around the project by the Mary C., an 85-foot tug with a 21-foot beam and an 11-foot hull, powered by a Fairbanks-Morse 300-hp diesel engine; and the launch Wolverine State, which has a 47 x 12 x 6-foot 2-inch hull, and is

equipped with a Kahlenberg 65-hp diesel engine.

Hydraulic Fill

Placement of the sand hydraulic fill started on September 13, 1947, and work had progressed from the north end of the big enclosure out 625 feet when winter set in and put an end to operations for the year. A temporary earth dike was built across the hole to hold the material in place until work was resumed on June 12, 1948. The fill was built up to elevation 9.5 at the center line of the project, with a 1 per cent slope dropping off on each side of the crown.

The material was obtained by dredging the Indiana shoals at the south end of Lake Michigan, about 4 miles off shore from Indiana Harbor, Buffington, and Gary, Ind. In this work the contractor used the hopper dredge Michigan, which has a capacity of 3,500 cubic yards and a speed of 10 knots per hour

loaded and 12 knots when running light. The average haul was 17 to 18 miles, with a maximum of 24 miles. The Michigan usually brought in two loads per day of 24 hours, and worked a 7-day week.

The Michigan followed a channel from deep water in the lake to the dock at the south end of the landing strip. The course down this 1,000-foot channel was marked by ranges which were lighted after dark to guide night operation.

Hopper Dredge Michigan

The Michigan was built in 1903 in Chicago as a Great Lakes ore and coal carrier. In 1928 she was rebuilt at Manitowoc, Wis., for the Great Lakes Dredge & Dock Co., to serve as a hopper dredge. The Michigan is 377 feet long, has a 48-foot 2-inch beam, and is 24 feet deep. Her gross tonnage is 3,751, and her net tonnage is 2,708. She has a plain bow stem, a rounded stern, one

deck, and two masts as distinguishing characteristics.

The dredge is powered by three coal-burning Scotch marine boilers which provide steam to turn the screw propeller at the stern, and also the Elliott (Concluded on next page)

**200,000,000 watts of
electric power**

**¼ million horse power
in prime movers**

**... BFM's 1947-8 back-
ground for handling your
power needs**

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by selecting your
lighting plants and
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BFM's huge stocks of
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and factory new pow-
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by buying at prices
which are in some
cases even below the
actual cost of manu-
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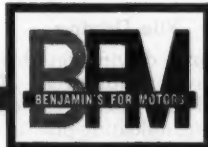
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STOPS MOISTURE FROM FALLING INTO TRACTOR EXHAUST
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THE CAP THAT DOES NOT FORGET TO CLOSE... Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa.

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Immediate delivery
Liberal dealer discount

No.	O.D. Exhaust	Retail
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2	2 3/8"	1.90
3	2 3/4"	1.90
5	1 7/8"	1.90
55	2"	1.90
5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 3/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00

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Your "CATERPILLAR" Dealer is your
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MOUNTED ON WHEELBARROW CHASSIS
Write for details and prices
ROETH VIBRATOR CO.
1737 Farquhar Ave.
Chicago 40, Ill.

2,000-hp steam-driven turbine. The latter runs the Bucyrus-Erie 30-inch main pump through a reduction gear at an 11 to 1 ratio. The turbine turns at 3,300 rpm, while the pump has a maximum of 300 rpm; it usually operates at 250 rpm.

On either side of the dredge is a sucker head, 5 feet long x 4 feet wide, made of steel bars forming 8-inch squares. This sucker head is at the end of a 30-inch intake pipe. There is no cutter head with these intake pipes, since the material is picked up by suction only. While the dredge can pump from both sides at the same time, the usual practice was to pump from only one side for a while, and then shift to the other side.

During the dredging operations the Michigan remained stationary, held by both fore and aft anchors. The craft can pump at a maximum depth of 50 feet, but on these sandy shoals the dredge worked in from 24 to 28 feet of water. Only sand was dredged, and as soon as clay was struck the dredge was moved. The normal procedure was to lower the sucker head to the level of the sand, start the pump, and leave the dredge at that spot until there was no more sand. The force of the pump pulled in sand from over an area of an acre or more.

Discharging the Sand

The dredge pump is slightly forward of amidships, midway between the four holds containing the sand borrow. In good digging the Michigan can take on a near-capacity load of 3,500 cubic yards in two hours; in one instance on this job she filled her bins in a record 55 minutes. An average vacuum of 23 inches was usually maintained on the intake line; and when this fell, the operator knew that he was running out of sand and that it was time to lower the sucker head.

At the dock a 30-inch section of pipe carried on the dredge was quickly connected to the land line on shore and the discharge line from the pump. Inside of five minutes the pump was discharging hydraulic fill on the beach behind the sheet piling, and within two hours the dredge was unloaded and ready to start back to the shoals for more sand. On the way to the dock the sand dried out quickly; accordingly, water was added through the sea cocks in sufficient amounts so that the discharge contained about 30 per cent of solids.



C. & E. M. Photo

Left to right are Mike Roberts, Job Superintendent on the placing of sand fill; Lester Gallagher, Master of the dredge Michigan; Fred Dummer, Chief Engineer of the Michigan; and Jim Finerty, Job Superintendent on dock-wall construction—all of the Great Lakes Dredge & Dock Co.

Down at the bottom of the hoppers or holds is a tunnel, 5 feet wide and from 2 to 4 feet deep, right over the keel of the dredge. Spray pumps wash the sand through this tunnel to the main pump; the pump forces the hydraulic material through the 30-inch discharge line at from 30 to 90-pound pressure, depending on the length of line and the type of material being pumped. The connection to the shore line has a Mobile ball joint at the dredge end and also on the dock end.

Up to 3,000 linear feet of 30-inch shore line has been employed in the discharge of the hydraulic fill. A Y-connection was made on shore so that both a short and long line were available. If the material chanced to be heavy, it was usually pumped out through the short line, while the finer sand was sent through the long pipe. In this way the material was evenly distributed and the Michigan was unloaded in the shortest possible time. The main consideration was to get the sand well down in back of the sheeting wall. The pipe-line crew on shore also worked 24 hours a day, through three shifts, to move the discharge pipe about as it was needed.

The Michigan was equipped with a Motorola mobile telephone unit with a direct hook-up to the field office at the dock. Thus on her way in to the island with a load of sand, her master made known his wants such as coal, provisions, etc. Supplies were obtained at once and stacked up on the dock ready to be put aboard as soon as the dredge was tied up.

Sand fill
Bulkhead
Riprap

800,000 cu. yds.
2,792 lin. ft.
8,300 cu. yds.

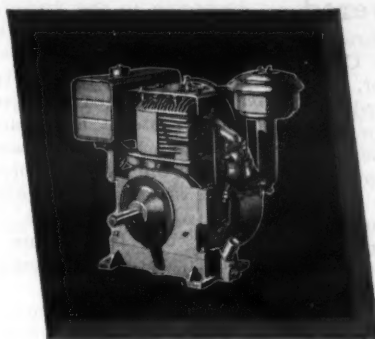
In the enlargement of this auxiliary airport, the Great Lakes Dredge & Dock Co. employed a force of about 40 to drive the piles and handle the shore discharge pipe, and another 40 on the dredge Michigan.

L. C. Hardwicke is Division Manager of the company, and John Wohlgenuth is Division Superintendent. On the project Jim Finerty was Job Superintendent of the dock-wall construction, and Mike Roberts was Job Superintendent on the placing of the sand fill. Captain Lester Gallagher is Master of the dredge Michigan, and Fred Dummer is her Chief Engineer.

The Northerly Island Airport improvement is part of the Federal-Aid Airport Program. For the Civil Aeronautics Administration, John J. Hogan is District Airport Engineer with headquarters at Springfield, Ill. R. H. Burke is Airport Consultant for the Chicago Airport Commission.

Quantities and Personnel

The major items in this steel-bulk-head and sand-fill contract for the improvement of Chicago's Northerly Island landing strip included:



"Preferred"
Air-Cooled Power

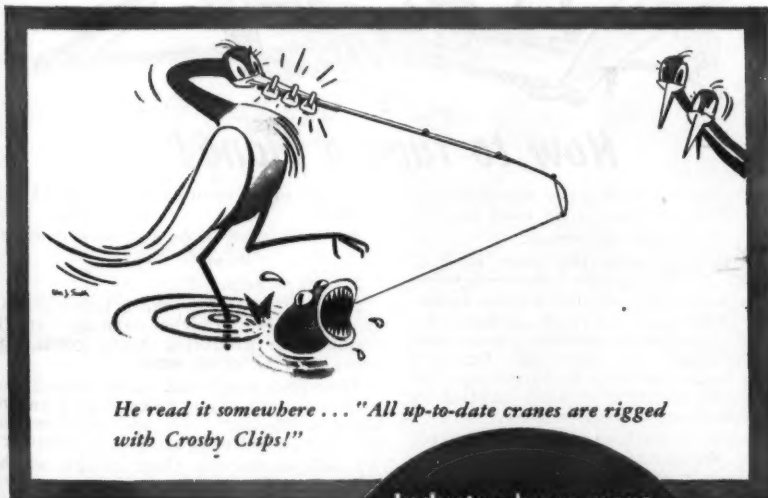
Get America's No.1 Power Value Briggs & Stratton

You get greater value, dollar for dollar, when your equipment is powered by Briggs & Stratton 4-cycle, single-cylinder, air-cooled gasoline engines!

No. 1 in design, workmanship, and materials. No. 1 in performance, economy, and durability. No. 1 in quality and availability of service. That's why Briggs & Stratton powered equipment gives better service and greater satisfaction.

These sturdy, compact engines are No. 1 with manufacturers, dealers, and users alike because they know that these precision-built engines run smoother, last longer, with less operating cost. Specify America's preferred power — Briggs & Stratton — for your gasoline engine power requirements.

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Fasten wire rope with CROSBY CLIPS. Safe, simple, speedy... applied anywhere by one man with one wrench. Drop-forged, not cast. Hot dip galvanized. All sizes... for 1/8" to 3" wire rope. Distributors everywhere; made only by AMERICAN HOIST AND DERRICK CO., St. Paul 1, Minnesota.

ALSO MAKERS OF THE
AMERICAN HANDWINCH AND
AMERICAN BLOCKS AND SHEAVES

Industry buys more

**CROSBY
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than all other
drop-forged
fasteners!





Electricity powers this new Homelite 84-pound paving breaker. It is supplied by a 120-pound dual-voltage gasoline-engine-driven generator.

New Paving Breaker Is Electric-Powered

An electric-driven pavement breaker is announced by the Homelite Corp., 71 Riverdale Ave., Port Chester, N.Y. This 84-pound breaker is powered by a dual-voltage gasoline-driven generator, which can also be used for operating other types of high-cycle tools or 110-volt tools and floodlights.

Homelite points out that the new breaker is unaffected by dust or abrasive particles; that the motor has no brushes or commutator to wear out; that there is no electrical connection between the rotor and stator; that sealed ball bearings support the rotor shaft; that a floating cylinder prevents the transmission of shock to the driving mechanism; and that the breaker's flat back rides comfortably on the operator's legs. An automatic switch on the plunger-pump lubricator is designed to stop the breaker when its oil reservoir is empty.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 59.

Line of Contractor Tools

A pocket-size folder listing a line of tools for use by contractors is available from Brunner & Lay, 727 S. Jefferson St., Chicago 7, Ill. Items it lists include chisel or moil points, Hi-Duty moil

points, 3-inch chisel bits, frost or digging chisels, asphalt cutters, moil points for clay diggers, clay spades or scoops, frost wedges, concrete busters, dirt tampers, sheathing drivers, bushing tools, chipping chisels, chisel blanks, flat chisels, cape chisels, brick hammers, drill steels for use with detachable bits, Timken rock bits, brick-removing tools and clay picks.

The catalog illustrates each item and includes a brief list of specifications for each, covering size and length of shank, length under the collar, and other information pertinent to each specific tool.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 9.

Equipment Cleaner

Power-driven units for steam-cleaning automotive and construction equipment are manufactured by the Thermek Engineering Corp., 555 Bryant St., San Francisco 7, Calif. The Instansteam generators can be supplied with electric-motor or gas-engine power units.

According to the manufacturer, the Instansteam unit will develop a good supply of steam or hot water within 30 seconds. It is of the flash type, and the steam must be used as generated—no boilers or steam tanks are provided. The gun nozzle is of the venturi type and feeds the cleaning solvent directly into the steam at the nozzle end; this eliminates the passage of solvent through the Instansteam coils. All solutions are strained before entering the steam gun.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 119.

Pumps, Hoists, Saws, Etc.

Pumps, hoists, saw rigs, and lighting plants are described in a 16-page catalog prepared by the Sterling Machinery Corp., 405 Southwest Blvd., Kansas City 8, Mo. Pumps described in Bulletin V include lightweight self-priming centrifugals, wheel-mounted self-priming centrifugals, self-priming jetting, multi-stage and two-stage non-self-priming, high-head, and belt-driven sand pumps. Hoists include the Type A and Type C single and double-drum styles. Also listed are two Sterling saw rigs and four Unitype power plants.

The catalog contains complete specifications on each of these units. It lists

their principal features, the advantages claimed for each, recommended applications of each, and other pertinent information. Bulletin V contains a double-page spread showing a Sterling hoist and listing its features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 84.

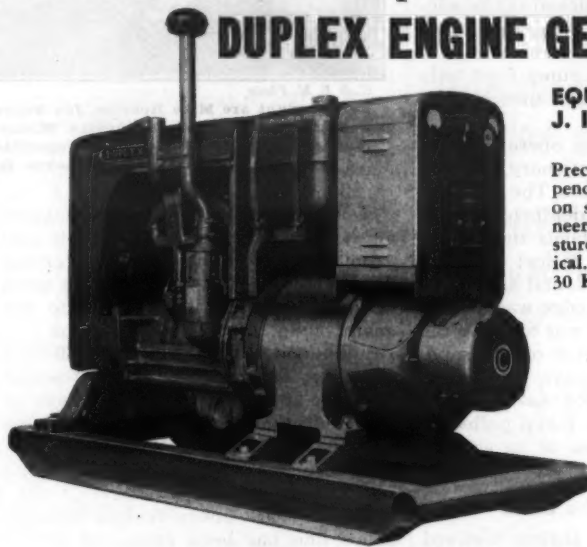
Jack Company Ups Gahl

William E. Gahl has been named Chief Engineer of Templeton, Kenly & Co. of Chicago. He succeeds F. J. Jakoubek, who has resigned to enter the manufacturing business for himself. Templeton, Kenly & Co. manufactures the Simplex line of jacks.

For Continuous Dependability . . . DUPLEX ENGINE GENERATORS

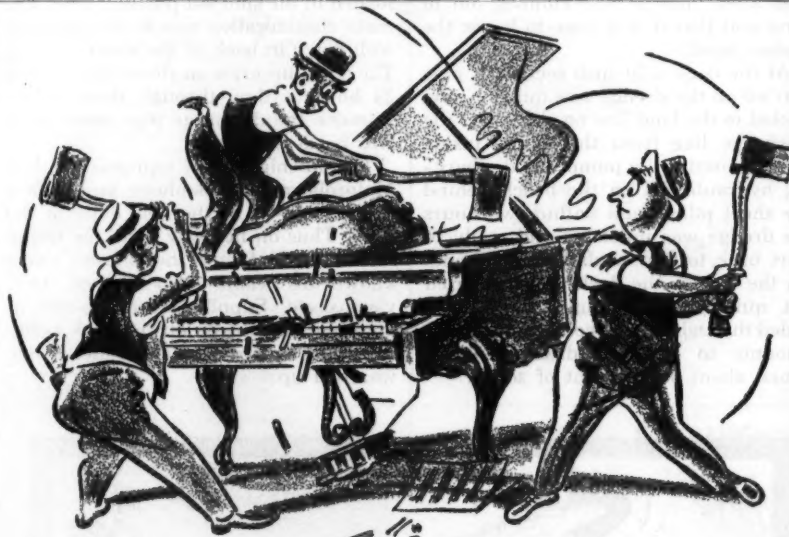
EQUIPPED WITH
J. I. CASE ENGINES

Precision construction and dependable components based on sound, experienced engineering make these units sturdy, efficient and economical. 3 sizes from 10 KW to 30 KW.



SEE YOUR J. I. CASE INDUSTRIAL DEALER OR
WRITE FOR FURTHER INFORMATION AND SPECIFICATIONS

DUPLEX
TRUCK COMPANY
LANSING, MICH.



How to tune a piano!

The piano's out of tune. So we'll chop it up. Then we'll get a tin horn instead.

Sure, these men are crazy.

But they're using the same kind of thinking a lot of people have been using on the American economic system lately.

Our American way isn't perfect. We still have our ups and downs of prices and jobs. We'll have to change that. But even so, our system works a lot better than the second-rate substitutes being peddled by some countries we could mention.

It works better because of a few simple things. We are more inventive, and we know how to use machine power to produce more goods at lower cost. We have more skilled workers than any other country. We believe in collective bargaining and enjoy its benefits. And we Americans save—and our savings go into new tools, new plants, new and better machines.

Because of this, we produce more every working hour . . . and can buy more goods with an hour's work than any other people in the world.

We can make the system work even better, too: by all of us working together to turn out more for every hour we work—through better machines and methods, more power, greater skills, and by sharing the benefits through higher wages, lower prices, shorter hours.

It's a good system. It can be made better. And even now it beats anything

that any other country in the world has to offer.

So—let's tune it up, not chop it down.

Want to Help?

I want to help.

I know that higher wages, lower prices, shorter hours and larger earnings can all result from producing more goods for every hour all of us work.

Therefore, I will ask myself how I can work more effectively every hour I am on the job, whether I am an employee, an employer, a professional man or a farmer.

I will encourage those things which help us produce more and add to everyone's prosperity—things like greater use of mechanical power, better machines, better distribution and better collective bargaining.

I will boost the good things in our set-up, and help to get rid of the bad.

I will try to learn all I can about why it is that Americans have more of the good things of life.

Approved for the
PUBLIC POLICY COMMITTEE
of the Advertising Council

by: EVANS CLARK, EXECUTIVE DIRECTOR, TWENTIETH CENTURY FUND. PAUL G. HOFFMAN, FORMERLY PRESIDENT, STUDEBAKER CORPORATION. BORIS SHISHKIN, ECONOMIST, AMERICAN FEDERATION OF LABOR.

Published in the Public Interest by:
CONTRACTORS & ENGINEERS MONTHLY

New Diesel Booklet

Mail coupon
for your
FREE copy.

Sheppard's

... Shows How
**You Can Save
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GIVES ALL the latest information on Sheppard Diesel power units (3.5 to 100 H.P.) and generating sets (2 to 36 K.W.).

DEALERS—There's a big market for Sheppard Diesels. That means quick profits for Sheppard dealers. Mail coupon for details.



SHEPPARD DIESELS, Hanover 17, Pa.

I want to save 75% on power costs. Send FREE booklet.

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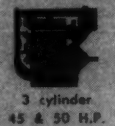
AUTOMOTIVE • STATIONARY • MARINE

DIESEL'S THE POWER . . . **Sheppard's** THE DIESEL

POWER UNITS 3.5 to 100 H.P.



6 cylinder
90 & 100 H.P.



3 cylinder
45 & 50 H.P.



2 cylinder
30 & 33 H.P.



1 cylinder
12 & 15 H.P.



Aircooled
1 cylinder
5.4 H.P.

Highway Accountants Check on Field Work

(Continued from page 1)

expert in contract construction costs.

Cross-Sectional Cost Studies

Not every contract is analyzed; only a true cross section of the jobs comes under State scrutiny. When the Contract Cost Section was first organized, only a few jobs were studied, but these have been increased until now about 50 per cent of all State Highway Commission contracts are carefully analyzed.

The purpose of the cost studies is quite obvious. They keep the Commission abreast of current costs, construction practices, and prices. They are invaluable for making accurate estimates on future work, for the adjustment of claims, for the preparation of price agreements, and for force-account orders.

In making the cost studies, it is essential to spend considerable time on each project, watching progress and making time-cost studies of the various operations. Methods are studied carefully because these form a basic part of the report. The cooperation of the contractor, superintendent, foreman, timekeeper, engineer, and inspectors is very essential in obtaining construction costs and data.

Most contractors keep good cost records and have a daily report, weekly report, or monthly report. These sheets, along with the contractor's books, payrolls, equipment-time records, and itemized bills, usually give quite complete details of costs on the various operations performed on each job. The records and reports made by the engineer and inspectors, and information obtained by personal contacts, observation, and time studies, are necessary in preparing a cost report of a project.

The analysis of these cost reports indicates the relationship between contractors' bid prices and actual costs, price trends, and the reasons for higher or lower bid prices.

The Cost Organization

The Contract Cost Section is composed of five men working under the direction of E. H. Clymer, Cost Analyst. In order to cover the state geographically, it has been divided five ways, one of the men being assigned to each territory.

Since the Oregon Highway Com-

mission's work is strictly on a statewide basis, there is usually a goodly number of jobs from which to make a selection for cost-study work.

One might suppose that the selection of jobs would be governed largely by the number of contractors who have good office records, but this is not the case. In fact, there are always plenty of job folders in the main office at Salem that represent small contracts. And there are still small contractors whose office records consist principally of their time book and their check stubs, usually carried in the hip pocket of the contractor himself or his superintendent.

Cost-Study Methods

When a job has been selected for study, the analyst for that territory makes a file folder for the job. Initial information which goes into this folder includes the contract itself with the bid prices, a set of specifications, and all copies of the initial correspondence which starts the work off.

The whole object of the study is to have in this folder, when the job is finished, a breakdown of actual costs and actual revenue on each item, and the cost of the job as a whole. To this end the file is set up so that running records can be entered from time to time as the men visit their jobs.

Let's go along with one of the men, and see what happens on a routine visit he makes to one of the jobs he's studying. He makes his rounds at least every three weeks, and frequently more often, driving in the state automobile assigned for his use.

The job we will visit is a 2½-mile section of new-location work on the Columbia River Highway. The progress has so far been good, despite some wet weather, extensive clearing and grubbing, and hard ground.

When we get out to the job, the state man first of all hunts up the superintendent and the resident engineer. With real and friendly interest, he asks how everything is going. The contractors have learned long ago that whatever information they give will be guarded like the secret of the atomic bomb, so the superintendent hesitates not at all. He tells the cost man they moved a new shovel in last week, that two tractors were down several days with major repairs, and that long overhaul is running a little high and to watch out for those costs.

The resident engineer contributes the tip that a bad slide has occurred along

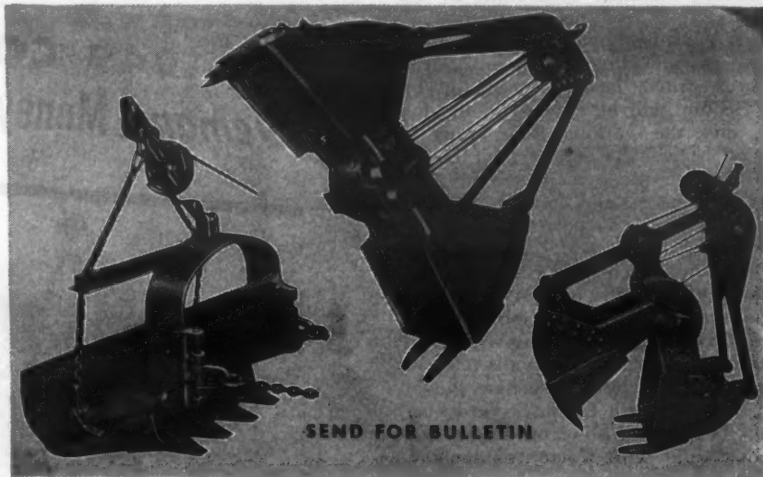
one of the slopes farther on, and there will likely be an extra-payment item for force-account work there. These are good things to know. The cost analyst jots them down on a memo pad, and the sheet will later be placed in his file folder for the job.

He then drives down to the office, just in time to tie in with a steaming

pot of freshly made coffee. With this stowed away, he and the timekeeper go into a huddle. The cost man gets a copy of all payrolls, and jots down information on the various invoices that have come in since his last visit.

The payroll, of course, is a mighty important key to cost data. The man-

(Continued on next page)



For Longer Life!
WELLMAN
Williams Type BUCKETS

Count on longer life and more efficient service... due to Wellman original welded rolled steel construction. You get the maximum digging power, and exceptional strength — without excessive weight! Specify Wellman, and you'll specify the best bucket for your purpose.

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7012 CENTRAL AVENUE CLEVELAND 4, OHIO

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The LULL Tilting-Tower UNIVERSAL Loader performs a large number of different material handling operations — during every season of the year.

Quickly interchangeable Material Buckets, Coal and Snow Buckets, Lifting Forks, Lifting Cranes, Lifting Platforms, Angle-Dozers, Bulldozers and Rotary Brooms — spell slashed costs and increased production.

LIFETIME hydraulic cylinder pistons and rings are standard equipment in all 3 sizes of Tilting-Tower UNIVERSALS — mounts on leading industrial wheel tractors — designed for cab installation.

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BULLDOZER •
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Users Find that

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—MULTIPLY MANPOWER Extremely easy to operate, they help workmen do more work, faster, easier. Ruggedly built to handle wider range of jobs.

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WRITE FOR BULLETIN CSP-4, giving full information on nine models of the Safety-Pull hoist—¾ to 15 tons capacity. See how they can help your workmen do more jobs—faster, easier, safer.



AMAZING HOIST-JACK
IS A HOIST—
A JACK—A PULLER

—3 useful tools in 1.
Built in two sizes,
2000 lb. and 4000 lb.
to handle scores of jobs.
Send for Bulletin CHJ.



COFFING HOIST COMPANY • Danville, Ill.

ELECTRIC, SPUR-GEARED AND DIFFERENTIAL CHAIN HOISTS;
"MIGHTY MIDGET" PULLERS; LOAD BINDERS

Highway Accountants Check on Field Work

(Continued from preceding page)

days of time, by classification, are listed there. Most of the man-hours are charged directly to the various key numbers which identify the bid items. Operating time of equipment can be accurately checked by looking at the operator time listed on the payroll.

All payrolls, invoices, and other expenses—including equipment rental charges—which have been set up by the Section will be entered in the job file, and the various items roughly totaled up to date. Completion of the job will require pin-point accuracy, but by that time all the costs will be in, and that kind of accuracy will be possible.

Our man then hightails it out to the grading site, because he wishes to make some time studies. The job is using some D8 Caterpillar tractors with 15 to 20-yard LeTourneau Carryalls and six Super C Tournapulls. The new shovel just moved in is a Lorain 2-yard machine. It will load a borrow section too tough to dig with tractor equipment, and the muck will be hauled by DW10's and Tournatrailers. The Tournatrailers are new to this territory, and the more carefully our man can analyze their performance, the more accurately highway engineers can forecast the methods on some future job.

Here on the job he checks the haul distance, gets load counts from the dump man on the fill, and analyzes hauling conditions. He checks with the master mechanic, and sees for himself how well the machines are holding up. All these details go into the file. Fifteen or twenty such visits are going to fill that file with valuable, accurate information before the job is finished.

The six cost analysts are experts in human relations. They have to be, to get all the information they do. They are genuinely interested in the job, the superintendent, and all of the men. They are all genial, all extroverts, all full of the same adventurous spirit which characterizes field construction men everywhere.

As we leave this job with our man, we notice that he waves a hand at the master mechanic, calls out "good luck" to the superintendent, and thanks the timekeeper for the information he contributed.

The Final Report

Later on, all this information is tabulated in a final report. The report has three main sections. Section 1 is called a "final cost analysis". Each bid item is listed on this report. Various columns off to the side then show the actual contract cost, the number of quantity

units, the actual unit cost, the unit-bid cost, and gross revenue applicable to each item. At the end of this section, the total actual cost is deducted from gross revenue, and the difference is job profit.

Section 2 consists of a detailed breakdown of costs. For example, the job

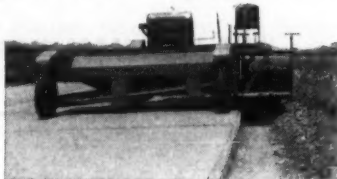
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1949 CONDITIONS Demand Money-Saving Equipment



... get set with this

APSCO BASE PAVER



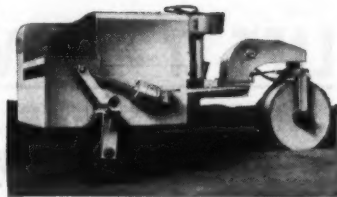
This paver answers a long felt need in the road building field. Can be operated by a two-man crew ... handles up to 150 tons per hour ... lays 8' to 12' width ... up to 12" thick ... has oscillating screed, dual steering and hydraulic brakes. ... Forms are not required—changing width or depth is simple, fast ... high speed reverse ... easily loaded on carry-all.

ROAD WIDENER

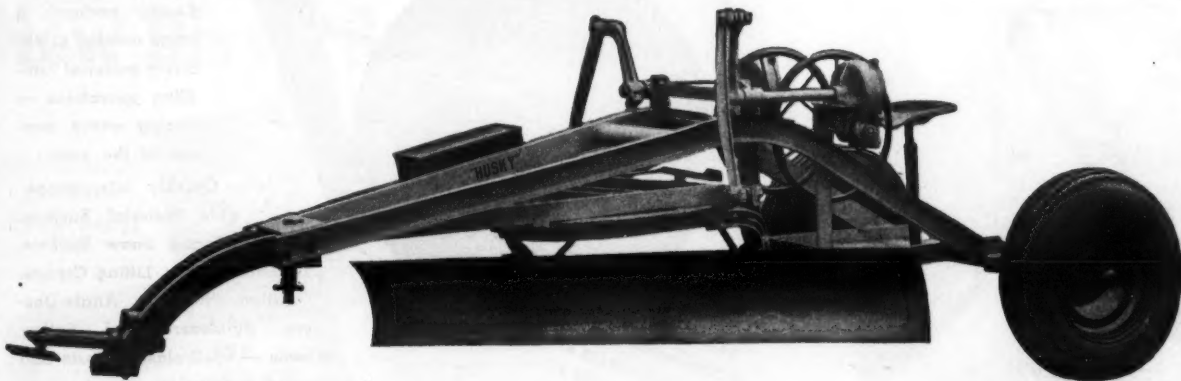
Run by two-man crew—powerfully built—handles any aggregate up to 6" in 2' to 8' strips.

TRENCH ROLLER

Ideal companion piece for widener—has pneumatic tired leveling wheel—maneuverable.



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The "HUSKY" All-Purpose Conservation DITCHER and TERRACER

The Model No. 33 HUSKY when pulled with a 40 h.p. wheel type tractor will complete more than a mile of new normal terracing per day. The No. 22 Model will complete nearly as much if soil conditions are favorable and if additional weight is added.

Both models are outstanding for highway maintenance and the No. 33 will rebuild a mile of normal Town road per day, ditches cleaned, sod cut and buried and the road complete ready for graveling.

HUSKIES are so strong that all parts, except tires, are guaranteed against breakage for one year regardless of why they break.

Manufactured by
NORTHFIELD IRON COMPANY
Write Department CC
NORTHFIELD, MINNESOTA, U.S.A.

Yours for the Asking

42 DESCRIPTIONS OF
NEW EQUIPMENT

38 REVIEWS OF
MANUFACTURERS'
LITERATURE

are included in the editorial columns of *Contractors & Engineers Monthly* this month. In each case, further information or printed matter is available without charge or obligation to interested C. & E. M. readers. Write direct or circle the corresponding number on one of the reply cards bound in at page 16. Our Readers' Service Department is becoming increasingly an Information Headquarters for contractors, highway engineers and distributors.

**CONTRACTORS
&
ENGINEERS MONTHLY**

470 Fourth Ave., New York 16, N.Y.



The IFCO No. 300 Turtle-Back safety helmet has an impact strength of 80 foot-pounds and is adjustable for head sizes 6 1/4 to 8.

Safety Helmets, Caps

Safety helmets and caps are manufactured by the Industrial Products Co., 2855 N. 4th St., Philadelphia 33, Pa. According to the manufacturer, the hats are moisture-proof and are not affected by exposure to rain or other dampness. They have adjustable sweat bands which can be set to sizes of from 6 1/2 to 8.

The Turtle-Back helmets are designed to have an impact strength of 80 foot-pounds; the caps, 40 foot-pounds. They are made from multiple layers of cloth-impregnated Bakelite, molded under a pressure of 250 pounds at a temperature of 300 degrees. The liner is attached so that the weight of the hat is evenly distributed, and it has spaces at the sides and top to allow free circulation of air.

Also available from the company are winter linings to fit under the helmet or cap and provide warmth and comfort in cold weather. Made of close-woven material, they fit over the head, neck, and ears, and are held in place by tying under the chin.

Further information on these helmets may be secured from the company, or by using the enclosed Request Card. Circle No. 85.

Chicago Office for Coles

An office in Chicago, Ill., has been established by Coles Cranes, Inc. It is located at 4318 S. Paulina St., and will be under the direction of George M. Bassnett, Executive Vice President and Sales Engineer of the company. Coles manufactures a line of mobile cranes on pneumatic tires, as well as for mounting on truck or railroad chassis.

Highway Accountants Check on Field Work

(Continued from preceding page)

we visited looks like this in the file:

Labor:	
Supervision, superintendent, and timekeeper	\$ 3,313.00
Labor	76,601.92
State industrial accident insurance	2,397.45
Social security	799.15
Unemployment insurance	2,397.45
	\$ 85,508.97

Materials:	
18-inch CIP, Prot. Invert, 410 LF @ \$1.71	\$ 701.10
18-inch bands, 18 ea. @ \$2.42	43.56
24-inch CIP, Prot. Invert, 412 LF @ \$2.69	1,108.28
24-inch bands, 15 @ \$3.07	46.05
36-inch CIP, Prot. Invert, 116 LF @ \$5.15	597.40
36-inch bands, 4 @ \$5.01	20.04
MC-2 asphalt, f.o.b. Willbridge, 5.43 tons @ \$13.90	47.68
1,200 lbs. Vigoro fertilizer @ \$63.00 per ton	37.80
2,400 lbs. New Lift fertilizer @ \$63.00 per ton	75.60
625 lbs. common rye grass @ 10c per lb.	62.50
500 lbs. English rye grass @ 21c per lb.	105.00
250 lbs. red fescue @ 70c per lb.	175.00
50 lbs. high bent mix @ 95c per lb.	47.50
25 lbs. bent grass @ \$1.05 per lb.	26.25
Freight on fertilizer and seed	20.00
	\$ 3,113.76

Equipment Rental and Miscellaneous Supplies:	
Equipment rental	\$69,933.00
Gas, oil, fuel, and grease	9,178.32
Move in, freight and cartage	850.47
Miscellaneous supplies	9,837.15
Field-office expense	823.96
Bond and insurance	1,377.51
P.U.C.	131.62
Home office and general overhead	6,057.84
	98,189.87
Total Cost	\$186,812.60

Section 3 of the final report consists of a typewritten analysis of construction methods, the quality of supervision, special conditions encountered, difficulties, and so on. Every fact which has a bearing on the job is entered in this report.

The report on this job shows the starting and completion dates, describes clearing, lists equipment and methods used, tells about the bad slide which had to be removed by force account. The last paragraph of the report shows how conversant the cost men have become with construction work, for it reads as follows:

"Although the contract does not show a large profit, the work was done during the winter months, which permitted the contractor to retain his organization. He also erected a large shop on the job, and the equipment was overhauled and painted. Part of this expense was not chargeable to the job, and costs have been adjusted accordingly. Moving of the sand excavation was not unduly delayed by wet weather, and lost time was

negligible. The operations were conducted on a one 8-hour shift per day basis, 6 days a week."

How well does this Contract Cost Section pay for itself? The estimates are many. Suffice it to say that R. H. Baldock, State Highway Engineer, considers it one of the most important departments under his general supervision. Thanks to the work of the cost analysts, engineers are preparing estimates which hit the bid prices very closely, usually within 10 per cent.

The \$64 question, of course, is "How much did Joe Jones & Co. make on the

Horseshoe Hill Job?"

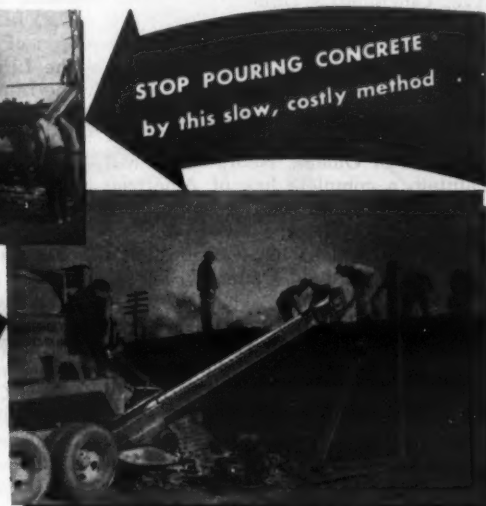
The boys will look at you when you ask that kind of question, smile, and say, "I wouldn't tell you even if I remembered."

But contractor profits are not what some suppose they are. Of all the contracts studied in Oregon in the past ten years, 10 per cent of the bid price was the biggest average profit per year, and the general overall average was only 4.8 per cent.

There is still opportunity in the construction game for alert superintendents, it would seem.



Do it the modern way—with CON-VAY-IT 12-20 Concrete Special



You'll marvel at the speed with which it delivers concrete, and at the money it will save you.

Mail coupon TODAY for particulars

AMERICAN CONVEYOR CO.
1115 W. ADAMS ST. • CHICAGO 7, ILLINOIS

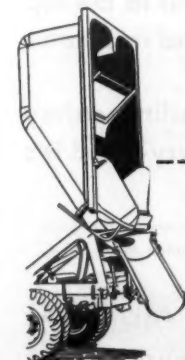
AMERICAN CONVEYOR COMPANY
1115 W. Adams St., Chicago 7, Ill.
I am interested in your CON-VAY-IT 12-20 CONCRETE SPECIAL. Please send me full information on this machine.

Name _____
Firm _____
Address _____

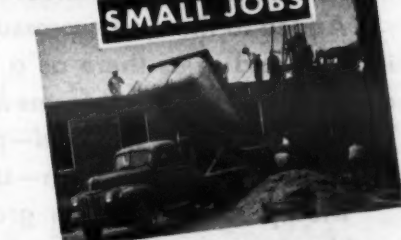
Over 1,500,000 YDS. of CONCRETE DELIVERED BY DUMPCRETE IN 1948



That's a lot of concrete. And the Dumpcrete placed it faster and cheaper. Mass pours for U. S. Engineers, Atomic Energy Commission and Bureau of Reclamation—small, slow pours into buggies and wheelbarrows—city and state paving work—footings and floors for industrial and housing projects. You name it. The Dumpcrete's done it . . . with identical loads of better concrete, accurately mixed at a central point. The low-cost, high production Dumpcrete can save for you too. Mail the coupon today.



The lower cost Dumpcrete is lightweight, watertight, with 13-foot chute, controlled higher discharge and lower center of gravity. Hauls sand, gravel, and coal too.



I want better concrete at lower cost. Mail me the facts today.

Name _____
Firm _____
Address _____

DUMPCRETE
DIVISION, MAXON CONSTRUCTION CO., INC.
518 Tolbert Bldg., Dayton 2, Ohio

Cross-Country Jobs Demand "Light Weight Plus Dependability"...

SUPPLIED BY



"Light weight Plus Dependability" really paid off on this subsurface exploration job across 11 miles of swamp and lowlands in Pennsylvania. Searching for a highway cut-off, this Acker Test Boring Rig, powered by a Heavy-Duty Air-Cooled Wisconsin, traveled on skids or oil barrel pontoons along the entire stretch, taking borings to depths of 60 feet.



Typical of Wisconsin built-in dependability is the mounting of the drop-forged crankshaft on tapered roller bearings at BOTH ends, to take up end thrust and radial thrust which permits mounting drive pulley, gear or sprocket directly on the extended crankshaft.

Specify Wisconsin Air-Cooled Power for "Most H.P. Hours" of on-the-job service . . . 2 to 30 hp., 4 cycle single-, two- and four-cylinder types.



WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 14, WISCONSIN

Distributor Doings

Pump Dealerships Are Available

A new line of self-priming centrifugal pumps is announced by the McGowan Pump Division of the Leyman Mfg. Corp., and J. H. Heintz, newly appointed Manager of Sales for the line, states that many dealer areas are not as yet assigned. Anyone desiring to handle the McGowan line should contact the Division's home offices at 58 Central Ave., Cincinnati 2, Ohio.

California Motor-Grader Dealer

The Weco Equipment Co., P. O. Box 8, North Hollywood, Calif., has been named exclusive distributor in California for the American Road Equipment Co. of Omaha, Nebr. Weco will maintain a complete line of American motor graders, as well as parts and service facilities for the entire line. The company also plans to open additional branches throughout California.

Highway Equipment Co. Expands

A new storage and warehouse building has been completed by the Highway Equipment Co. This 60 x 100-foot addition is adjacent to the company's present property at 6465 Hamilton Ave. in Pittsburgh, Pa. In addition to the Pittsburgh office, Highway maintains a complete sales and service branch in Harrisburg.

The company also announces the appointment of Fred M. Carothers as District Sales Engineer with headquarters in Meadville. Mr. Carothers was formerly associated with the Drott Mfg.

Corp., Oliver Corp., Pennsylvania Department of Highways, and several construction firms.

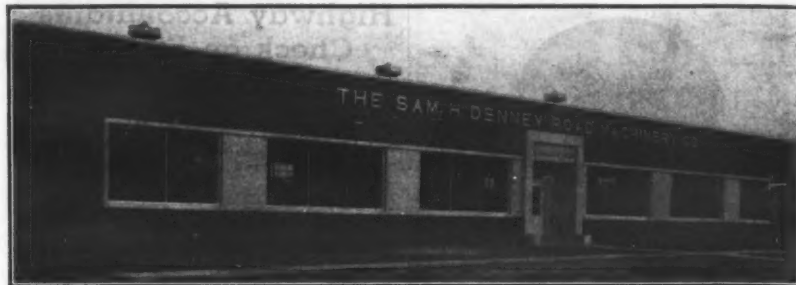
Lines handled by Highway Equipment Co. include those of Allis-Chalmers Mfg. Co., The Jaeger Machine Co., The Baker Mfg. Co., Gar Wood Industries, Inc., The Frank G. Hough Co., Master Vibrator Co., Independent Pneumatic Tool Co., Wayne Crane Division of the American Steel Dredge Co., Inc., Detroit Diesel Engine Division of the General Motors Corp., and the Lima Shovel & Crane Division of the Lima-Hamilton Corp.

Philadelphia Branch for L. B. Smith

L. B. Smith, Inc., has opened a branch office at 29th and Montgomery Ave. in Philadelphia. It occupies 3,000 square feet of floor space and includes sales offices and a well stocked parts department. Plans are under way for the construction of complete shop facilities.

Smith serves contractors in the central and eastern Pennsylvania territory. The company's main offices and plant are at Camp Hill, Pa.

Manufacturers represented include The Thew Shovel Co., The Euclid Road Machinery Co., Iowa Mfg. Co., Gardner-Denver Co., W. A. Riddell Corp., Sanderson Cyclone Drill Co., The Daybrook Hydraulic Corp., The T. L. Smith Co., Hercules Motors Corp., Minneapolis-Moline Power Implement Co., Wellman Engineering Co., Ralph B. Carter Co., and All-Purpose Spreader Co.



The new Denney warehouse and display building completed last December will soon be followed by others to house offices and parts and service departments.

New Headquarters for Denney Co.; Isbell Is Asst. General Manager

The Sam H. Denney Road Machinery Co. has built and is now occupying a new warehouse and showroom in Wichita, Kans. The building measures 60 x 130 feet and is built along a railroad spur. Two other new buildings—to be built on the other side of the spur in the near future—will house the company's offices and parts and service department. The same architectural

design will be carried out in the new buildings which will cover 24,800 square feet.

The Denney sales staff has been increased by four territorial salesmen to insure closer contact with customers in the 71 western counties of Kansas which are covered by Denney. Lyle Isbell, formerly with the Tractor Equipment Division of the Bucyrus-Erie Co., has been named Assistant General Manager, and Howard Babcock as

(Concluded on next page)

a half-million tons of earth on the move...

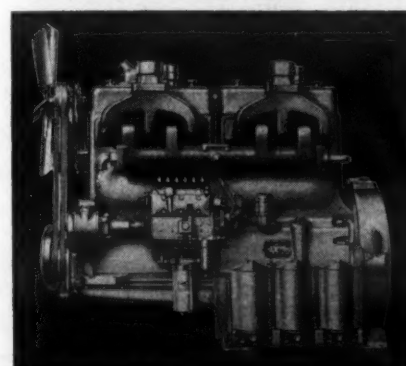


● It's Long Island, but they're not digging clams. Tully & Di Napoli, Inc., are the contractors. It's a New York Life Insurance Co. project at Long Island City, L. I., N. Y. Two 13-story apartments are going up. And a half-million tons of earth are on the move. That's digging with a capital D. The big D is for Diesel. The Waukesha Super-Duty Diesel (Model 6-WAKD with hydraulic coupling) that powers this 2-yd. Model 820 Lorain Shovel.

Super duty! That's what it's for... and what it does. Here's what it has—a 4¾-inch 7-bearing hardened crankshaft... full pressure lubrication, with outside mounted oil pump and oil cooler... intermittent pressure oil-cooled piston crown... overhead valves with Stellite seats... patented controlled combustion chamber... aluminum pistons with six piston rings... full length water jacket, with removable, hardened cylinder sleeves... either electric or gasoline engine starting... and other modern features—for clean burning, high economy, lively performance and long life. Send for Bulletin 1415.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK TULSA LOS ANGELES

WAUKESHA



Diesel ENGINES

WAUKESHA Super-Duty Diesel (Model 6-WAKD)—six cylinder, 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displ.

MUD-JACKING IS REDUCED TO ONE OPERATION with BITUCOTE



Mud-jacking has become—not only a single, simple job—but also it's the last time that slab needs to be leveled when it's properly done with non-volatile, safe Bitucote asphalt emulsion... It's used unheated and it's non-hazardous.

Added to the slurry, pressure-pumped under the slab, it cures and dries there as a permanent, stable, water-resistant sub-base that forms its own seal right to the top surface of the slab. This seal—plus stability and resistance to impact and compression—stops pumping.

Mud-jacking takes on greater practicability, safety and importance with Bitucote - stabilized slurry—and it's economical and time-saving, too.

Send for Bitucote improved procedure for one-operation mud-jacking.

Bitucote
PRODUCTS

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1411 CENTRAL INDUSTRIAL DRIVE • ST. LOUIS 10, MO.
Plants: Cincinnati, O. • St. Louis, Mo. • El Dorado, Ark. • Buffalo, N. Y.

Distributor Doings

(Continued from preceding page)

Sales Manager.

Lines handled by Denney include the J. D. Adams motor graders, International Harvester tractors and allied lines, Trojan motor patrols, Hough Pay-loaders, Link Belt Speeder shovels, and a complete line of small tools for contractors.

B-E Dealers for Pennsylvania

The State Equipment Co. of Harrisburg and Kingston, Pa., has been appointed a distributor for the Bucyrus-Erie Co. The company will handle the B-E excavators in the east-central Pennsylvania area, which is bounded on the east by the counties of Wayne, Pike, Monroe, Carbon, Schuylkill, Lebanon, and Lancaster, and on the west, by and including the counties of Bradford, Lycoming, Union, Mifflin, Huntingdon, and Franklin. State will not handle the B-E Hydrocrane in Huntingdon and Franklin Counties, but will in Tioga County.

Furnival Machinery Co., Philadelphia, will continue as excavator and Hydrocrane distributor for southeastern Pennsylvania. Beckwith Machinery Co. of Pittsburgh and Bradford will continue to handle excavator sales in the western counties. Hydro-Crane distributor in these counties is Dravo-Doyle Co. of Pittsburgh.

Personnel Changes for Boehck

Boehck Engineering Co., Inc., of Houston, Texas, has announced three changes in its personnel set-up. Pat-

rick Angenend has been named to head Industrial Sales; O. E. Capehart is the new Office Manager; and Arnold Oehlers now represents Boehck in the counties immediately west of Houston. The company handles a complete line of construction equipment and tools.

New York Dealer for "Quick-Way"

Mahoney-Clarke, Inc., 217 Pearl St., New York 7, N. Y., has been appointed distributor for the "Quick-Way" Truck Shovel Co. The firm covers the five boroughs of New York City, Nassau and Suffolk Counties in Long Island, seven New York State counties, and twelve counties in New Jersey. Mahoney-Clarke, Inc., handles a complete line of contractors' equipment and supplies.

New Officers for Thompson Corp.

Three new officers have been elected by the Thompson Materials Corp., construction-materials dealer in the New York metropolitan area. E. J. Savage is Executive Vice President and General Manager in Charge of Sales. A. J. Zimmerman is Vice President in Charge of Specialty Products. And J. Charles Huber is Treasurer.

Changes at Penn's Mineola Branch

H. O. Penn Machinery Co., Inc., announces personnel changes for its Mineola, Long Island, branch. Robert O'Bryan, who has joined the sales staff, will handle machinery sales and assist Preston F. Kibbe, Manager of the branch. Hal Barber, who formerly held this position, is now covering the Brooklyn, N. Y., territory. Stanley E. Wardell, Advertising Manager for the company, will concentrate on sales in Queens County. He formerly handled sales in Kings County as well as Queens.

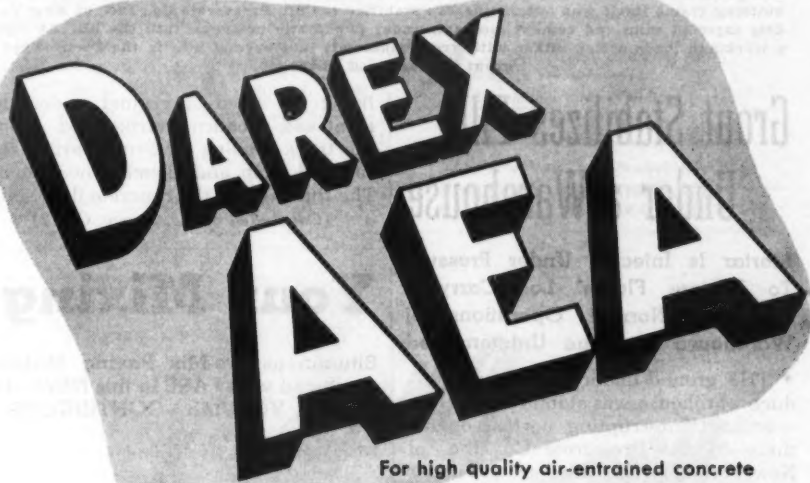
All-Out Aid in Snow Fight

Last month's fight against the elements in the snow-bound west required the utmost in cooperation of men and equipment. Responding to the crisis caused by the freakish weather, members of the Associated General Contractors of America, from California to Michigan, made available hundreds of pieces of equipment, as well as much of their trained personnel.

Offers of heavy-type civilian-owned equipment needed in the snow fight poured into the Army operations head-

quarters at the rate of more than 100 daily. Such offers are, perhaps, especially noteworthy because there was no assurance whatever that funds would be made available to pay for the work or rental of equipment.

The labor unions in the area also pitched in against the crippling snow. They furnished all contractors' employees with the proper clothing for snow-fighting in zero weather. And the Engineer Operators Union and the Building & Trades Union advanced needed funds to the operators until pay checks were received.



For high quality air-entrained concrete — backed by a competent engineering field service readily available from your distributor.

DEWEY AND ALMY CHEMICAL COMPANY
CAMBRIDGE 40, MASS.



FROM JOB TO JOB --- TRUCK SPEED

That's what you can do with an Eagle Loader! New contracts will demand more speed, more work for the same money. An Eagle can help you do just that.

- One man operation
- Handles any loose material, quickly and economically—dirt, cinders, gravel, snow, etc.

Write for more information—Dept. CE-39



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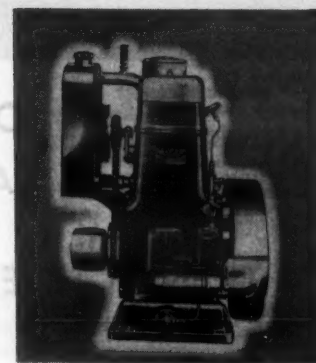


7.5 KVA-AC Dieselelectric Plant

There are two main reasons why Witte customers are satisfied customers.

Witte Dieselelectric Plants and Diesel Power Units help them cut fuel costs. A Witte is a full diesel; it starts and operates on low cost fuel oil. It eliminates the risk and cost of gasoline, cutting fuel costs substantially in most instances. And the Witte pre-combustion chamber assures full fuel combustion, giving you the maximum amount of power from every dollar you spend for fuel.

Witte Dieselelectric Plants and Power Units are reliable. They give continuous, trouble-free performance year after year under strenuous operating conditions. All the power a Witte can produce is always at your command instantly. Simple, sturdy, compact construction practically eliminates maintenance problems.



4 H.P. Diesel Power Unit

WHAT SIZE DO YOU NEED?

Witte Dieselelectric Plants range from 3 to 10 KVA-AC; 2.5 to 8 KW-DC. Witte Diesel Power Units are from 4 to 12 H.P. And they are available with either radiator or tank cooling system. See your Witte dealer; or write for free illustrated literature.

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**WITTE DIESELECTRIC PLANTS
AND DIESEL POWER UNITS**



UNITED STATES STEEL



C. & E. M. Photos
The ground under this Maspeth, Long Island, meat warehouse had settled so badly that the building frame itself was out of line. To stabilize the fill, Presscrete Co., Inc., of New York City injected sand and cement mortars, under pneumatic pressure, into the fill. At right, a workman loads a Rex mixer with grout material; just beyond him is the Prehy Type B grout injector used on the job.

Grout Stabilizes Fill Under a Warehouse

Mortar Is Injected Under Pressure To Restore Floors' Load-Carrying Capacity; Normal Operations of Warehouse Continue Uninterrupted

† THE ground under a meat-and-produce warehouse was stabilized recently—without interrupting normal operations—by the Presscrete Co., Inc., of New York City. The filled ground under the floor had settled to such an extent that large cracks had developed. Steps had to be taken at once to correct the faulty ground condition and to prevent further settlement.

The warehouse, located at Maspeth, Long Island, is leased by a large grocery chain which uses it as a distribution center for the New York metropolitan area. It is situated on a fill of various kinds of material deposited over a stratum of compressible silt from an old bog formation. Uneven settlement caused cavities to form in the affected area and these voids left many sections of the building floor without safe ground support.

The corrective work included stabi-

lizing the filled-in ground under the meat-and-produce refrigerated room, the truck-loading platform, part of the railroad ramp, and the machinery room. The thickness of the concrete floor slabs (Concluded on next page, Col. 2)



Your Mixing Problem

Bituminous Pre-Mix Paving Materials can be produced with EASE in this NEW—HIGH SPEED—HIGH VOLUME—CONTINUOUS MIXER.

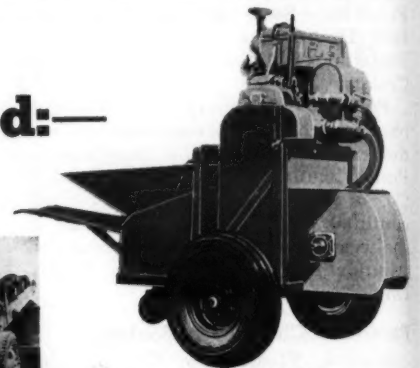
Mix: from ground level with belt conveyor attachment

Mix: at truck loading level with mixer mounted on elevated standards under storage bins

Mix: directly from dump truck with mixer discharging into a windrow or stock pile



Solved:—



MODEL JR

CAPACITY: Up to one ton per minute
POWER: Wisconsin or Equal Gasoline Engine 12 H.P. Air-cooled

PROPORTIONING: Variable volume Rotor feed for aggregate. Variable volume pump with micrometer manual control for asphalt

MOUNTING: Trailer mounted with tow bar and standing support

MIXER: Triple mixing shaft 12" wide operated at 150 to 250 R.P.M.

Write:—

McConnaughay
EMULSIFIED ASPHALT
PLANTS AND PROCESSES
WEST LAFAYETTE, INDIANA



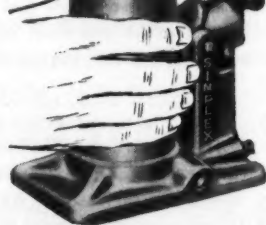
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Whatever your need, there's a Simplex Hydraulic Jack to do the job with efficiency that means hours and dollars saved. There's extra safety, too, with Simplex—every model is tested to 50% over rated capacity.

Other features that insure easier, faster, more dependable operation include

Neoprene packing seals, pressure tested bases, a long pump stroke that requires less effort, operation either horizontally or vertically. Available in 8 models—3 to 100 ton capacities.

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Jacks

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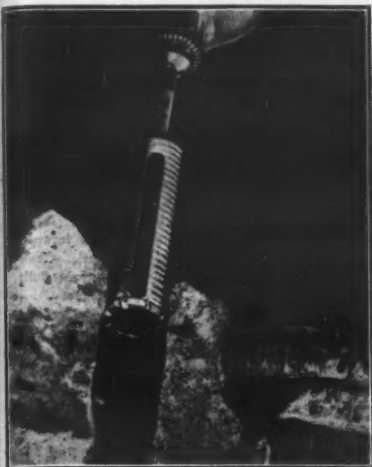
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The Tilden rotary concrete drill bit has a special core-drill design and a side exhaust slot to permit core particles to escape during drilling.

Concrete Drill Bits

An improved rotary concrete drill bit is announced by the Tilden Tool Mfg. Co., 1995 N. Fair Oaks Ave., Pasadena 3, Calif. It features a side exhaust slot designed to permit core particles to escape during drilling operations, so that they cannot pack around the drill and cause overheating.

According to the manufacturer, the drill bits will penetrate concrete at speeds of 2 inches or more per minute in diameters of from 1/4 to 2 inches. They have specially treated sintered-carbide cutters located around the perimeter of the core. The Tilden drill bits are designed for use with any standard electric drill motor.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 94.

Grout Stabilizes Fill Under Warehouse Floor

(Continued from preceding page)

varies from about 6 to 8 inches, and the refrigerated room has a special insulated floor construction consisting of two slabs of concrete separated by a layer of cork.

Special Problem

The nature of the warehouse created a special problem, since the work had to be done with a minimum of dust upheaval and without interfering with normal operations.

Grouting

Grouting was accomplished by using the Weber system of soil stabilization. Sand and cement mortars were injected under pneumatic pressure into the fill beneath the building. The fill was thus solidified by compression, with sufficient pressure applied to guard against any future settlement.

The grout holes were drilled in a grid pattern spaced from 8 to 12 feet apart. The holes were made by Ingersoll-Rand drills equipped with 2 3/4-inch Timken bits. Special dust collectors were used to prevent the escape of dust into the air. Expanding pressure-tight jam plugs were inserted in these holes. The top of the plug was closed with a standard cap to prevent the escape of grout being placed in other holes. The cap could be removed when it was necessary to inspect grout progress.

Hose from a Prehy Type S grout injector was connected to the jam plug, and mortar was shot in at pressures varying from 60 to 125 psi, depending upon the condition of the fill, the length of hose, and the vertical rise. The

grouter, driven by a Le Roi 160-cfm air compressor, was located outside the warehouse, on a loading platform.

Even though the holes were drilled in a regular pattern, there was no way of telling in advance in what direction the grout material would travel, nor how much material each hole would take. Pumping was therefore continued until complete refusal of intake was obtained.

The amount of grout forced into each hole varied from 3 to 5 cubic yards; this indicates the large cavities which existed. Necessary surface grade adjustments were made later by customary methods. The grouting material was a mixture of sand and portland cement, with lime or a few pounds of bentonite added as a lubricant. Holes left by the jam plugs were filled with a mixture of sand and cement. The grout material was prepared in a Rex mortar mixer.

Personnel

The crew consisted of 8 men—a

foreman, an operating engineer for the air compressor, and six laborers. James E. Devine was Foreman on the job for Presscrete.

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- Cuts faster result of unique plow-shaped teeth
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Almost a quarter of a century ago, this Lorain-75—equipped with a Twin Disc Clutch—worked for Highway Construction Company, Inc., on public-road jobs.

Today, this giant Lorain Moto-Crane—equipped with a Twin Disc 21-inch Hydraulic Coupling Power Take-Off Unit—is operated by Jones and Laughlin Steel Corporation.

In November, 1925, The Thew Shovel Company installed a Twin Disc Clutch on its new Lorain-75 shovel, a machine that marked the beginning of Thew's present line of products.

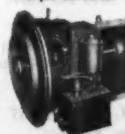
Nearly 23 years later, Thew introduced a rubber-tired, two-engine Lorain Moto-Crane, equipped with a Twin Disc Hydraulic Power Take-off. Moto-Crane, said to be the world's largest, weighs 65 tons and has a capacity of 45 tons at a 12-foot radius.

For nearly a quarter of a century Twin Disc units have been used on heavy-duty equipment built by The Thew Shovel Company—one of 97 leading manufacturers of material-handling and earth-moving equipment who find Twin Disc Clutches and Hydraulic Drives efficient units for power transmission. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Reduction Gear



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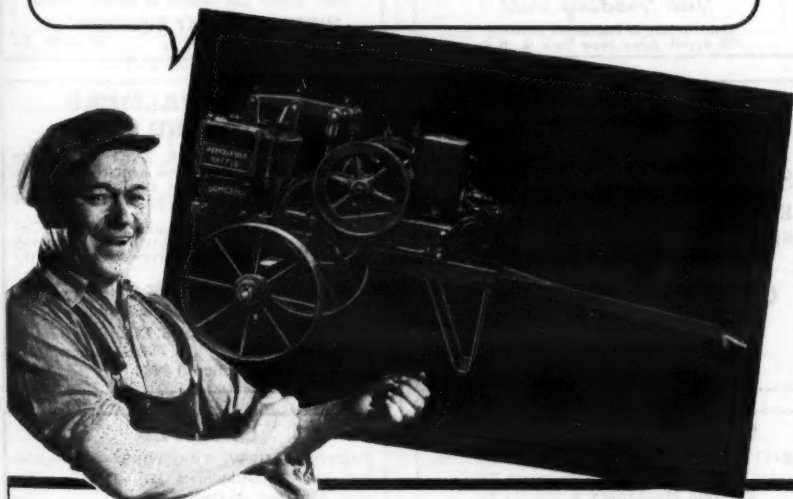


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1—Model 40-A Loran Crane and Dragline—33 ft. boom—tagline—1/4 yd. dragline bucket. Cat. D-4000 Diesel Engine. 30 inch crawler pads.

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8—Euclid Bottom Dump earth hauling units—Model 38FDT—new May, 1948—approximately 750 hours of operation.

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2—Caterpillar No. 12 Motor Graders.

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1—Sullivan 365 cu. ft. Air Compressor for mounting on tractor.

4—Super C' Le Tournepulls with TLP Carryall Scrapers. Good rubber all around.

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1—Fruehauf Tandem Heavy Duty semi-trailer, Model CPT.

1—20-D Northwest Shovel with Murphy Diesel Engine, 2-1/2 yd. dipper.

1—Link-Belt Model K-500 Shovel, Serial No. 2707. New May, 1948. 931 hours of operation—3 yd. Esco Dipper.

2—Jaeger Concrete Mixers, Model 11-EL and 14-EL.

This equipment located at our yard in Kirkwood, Missouri, or on jobs near St. Louis, Missouri. We also have many other items of used construction machinery for sale.

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Box 3775

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42¢ per Ft.—60 Ft. Long

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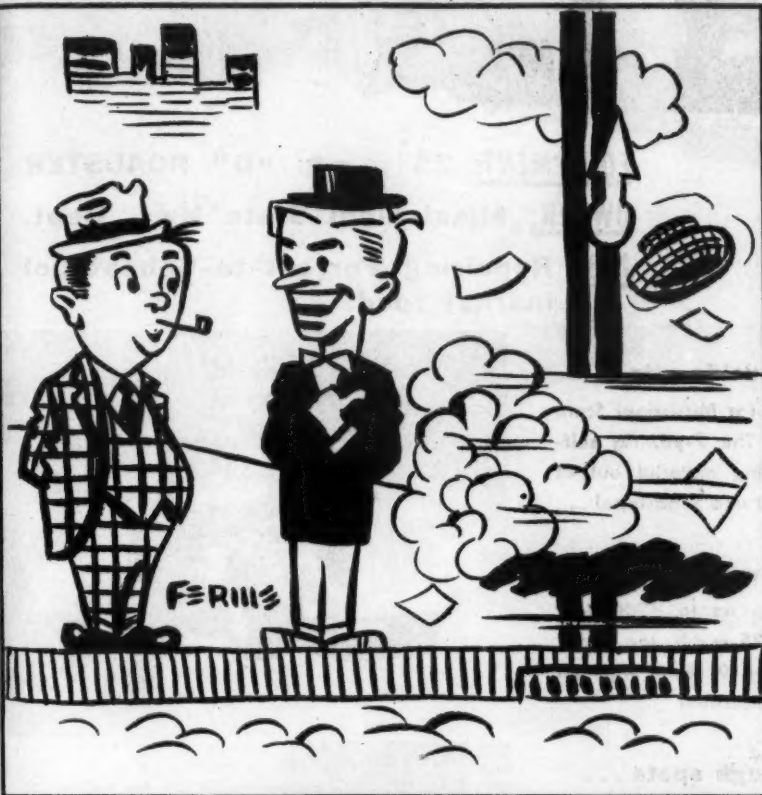
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1-Man Road Maintenance Gang



EQUIPMENT: 25 m.p.h. "D" ROADSTER
OWNER: Mississippi State Hwy. Dept.
JOB: Repairing Forrest-to-Sebastopol market road.

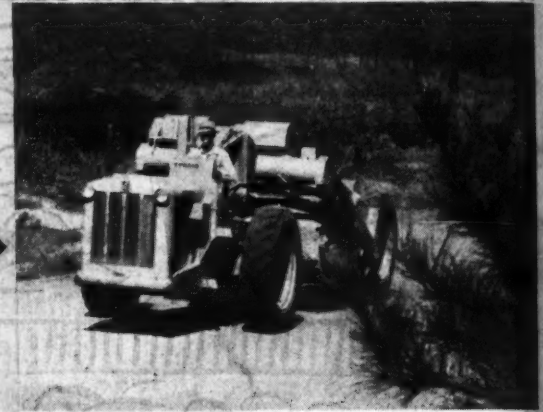


Self-loads out of roadside pits...

Here's a typical assignment for Mississippi State Hwy. Dept.'s D Roadster: The 7-yd. rig self-loads sand and clay topping material out of roadside pits between Forrest and Sebastopol...

Hauls $\frac{1}{2}$ the mile one way...

On haul distances, ranging up to 4200 feet one way, the D Roadster's 25 m.p.h. top travel speed enabled it to chalk up 9 round trips an hour... good one-man production!



Patches holes and rough spots...

Tournapull's 14.00 x 32 tires help compact fresh fills as rig spreads. All scraper operations, as well as positive power steer, are handled by finger-tip electric controls.

"Turns around in mighty tight places"

says operator Roger Hillman... "easiest rig I have ever operated... and I have run crawlers, graders and trucks. Rides better than a truck... sure gets down the road... has good brakes... stops on a dime."



Saves time and costs on shoulder work.

On a previous job, trimming shoulders, Supt. Ross Bounds, Jr. reports their "D" completed 6 miles on both sides in one day... where it used to take one grader, a loader and 3 trucks to handle 1 mile on one side.

Don't wait another day to find out how this 100 h.p., rubber-tired, 25 m.p.h. D Roadster can reduce your road maintenance. Write, or call your LeTourneau Distributor today!

To: R. G. LeTOURNEAU, Inc., Peoria, Ill.

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☐ Specifications ☐ Price ☐ Delivery

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STREET.....

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